SB369
C58

CLEMSON COLLEGE LIBRARY
DEC 12 1957
AGPI.

Representative of Every Interest

The Citrus Industry

Representing No Special Interest

Citrus Insect Control For December, 1957

How To Buy . . . An Irrigation System Part IV

The Two Medfly Eradication Programs In Florida

The Experimental Studies On Citrus Nematodes

Some Future Problems And Future Possibilities In Florida Agriculture

The Department of Fruit Of The University of Florida — Its Organization And Objectives

Problems Related To Production And Distribution of Cartoned Orange Juice

New Developments In Maintaining Quality Crops

Southeastern Chermugic Conference Members Hear of Florida Fruit

1956-57 Florida Oranges Produced 570,000,000 Gallons of Juice

Single Copy ..... 15 Cents

Subscription:
$1.00 Per Year In Continental U. S.
$2.00 Per Year Outside

Appearance Isn't Everything But It Helps Mightily . . .

Florida citrus growers have long taken pride in the fact that mature citrus offers the consumer the most palatable fruit of the sort grown anywhere, and that the juice content of Florida citrus far exceeds that of any grown elsewhere in this country.

Yet in spite of these advantages we now hear a reliable research report to the effect that during the past ten years the per capita consumption of Florida citrus has declined 10 per cent.

Of course, the decline in production in other sections of the United States and the increase in the population of the nation has enabled us to produce and sell a larger volume of citrus than ever before.

But research gives us the market reaction . . . so we must not only grow more palatable fruit, but we must grow better looking fruit, if we are going to increase our standing in the market.

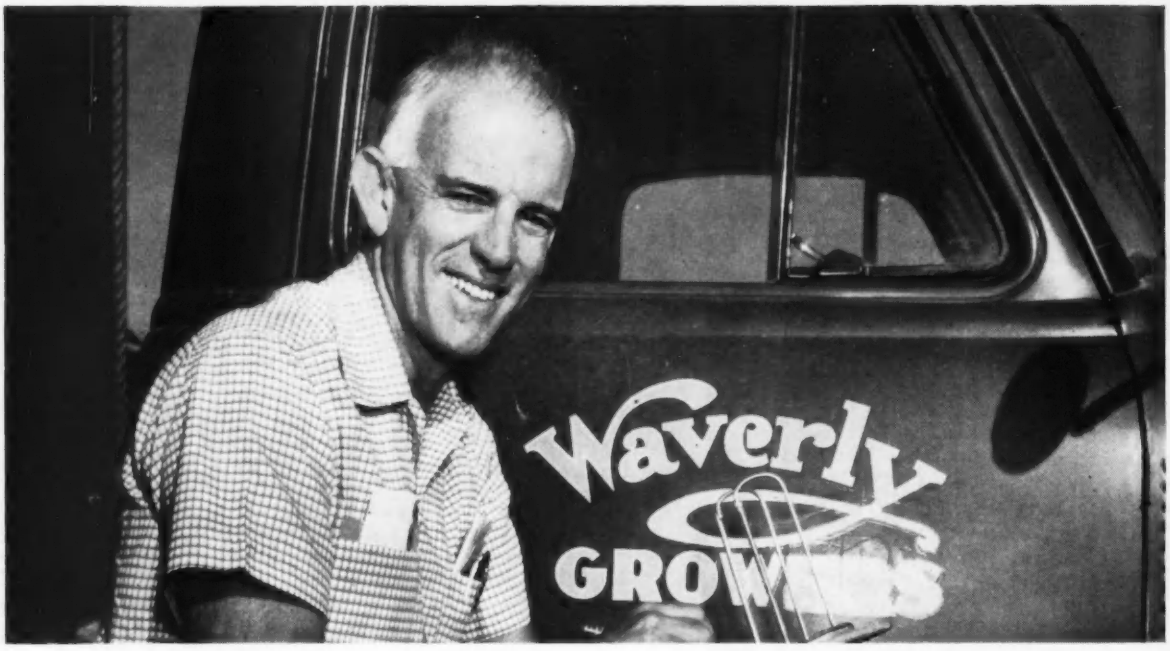
Every grower in the state should accept this challenge and do his full share to improve our product.

VOL. 38 — NO. 12 DECEMBER, 1957 BARTOW, FLORIDA

Reports excellent control of lemon scab and anthracnose

Charles D. Kime, Jr., (below), Production Mgr., Waverly Growers Co-Op, Waverly, Florida, says:

"ORTHOCIDE gave us excellent control on lemon scab and anthracnose in our nursery," reports Mr. Kime. "All of the ORTHO products we have used have consistently been of the highest quality. Technical field service supplied us by the ORTHO people has been of extreme assistance to us as well as the whole citrus industry."



Leading Florida Citrus Growers use a *complete* ORTHO program—here's why:

When you buy the ORTHO program, all the personal, on-your-ground technical advice and services of your ORTHO Fieldman are provided gladly and without any extra charge. Too, with ORTHO, you're associated with the leader. ORTHO Research first developed highly refined petroleum oil sprays in the form of new type emulsions and ready-mixes. Under such brand names of VOLCK Soluble, and Florida VOLCK these oil sprays today are known and respected by growers the world over. Include these top-choice oil sprays in your control program, too.

ON ALL CHEMICALS, READ DIRECTIONS AND CAUTIONS BEFORE USE

T. M.'S REG. U. S. PAT. OFF.: ORTHO, VOLCK

ORTHO®

California Spray-Chemical Corp.
P. O. Box 7067, Fairvilla Road, Orlando, Florida.

ORTHO products are formulated in Orlando especially for Florida Growers.
ORTHO—serving Florida agriculture for more than 33 years!

Contact these ORTHO Fieldmen:

Ft. Myers—Art Alberty
Lake Alfred—J. S. Murphy, Jr.
Lakeland—Jean E. Mabry
Leesburg—Charles Ashley
Orlando—Cliff Sutton
Orlando—John Nowell
Perrine—Dick Acree
Plant City—Webster Carson
West Palm Beach—Luke D. Dohner
West Palm Beach—Perry L. Sparkman

R. M. Pratt

Citrus Insect Control

R. B. Johnson

For December 1957

W. L. THOMPSON
R. M. PRATT
R. B. JOHNSON*
Florida Citrus Experiment Station, Lake Alfred

W. L. Thompson

Purple scale infestations increased sharply in November, and will continue to increase in December. The population will be above average in the winter and spring. Red scale infestations are generally at a low level and the average population will not increase in December.

Both purple mite and Texas citrus mite can be expected to increase in December and may cause severe injury even at relatively low populations.

The rust mite population has tripled since the middle of October and will increase further, with a peak at a high level being reached early in December. The level will remain high through the month.

SPRAY PROGRAM

Dry windy weather plus light to heavy infestations of purple mite, Texas citrus mite, and rust mite have caused "firing" and a general leaf drop in most areas. If dry, windy weather develops or continues through December, further leaf drop may be expected. If the mites, regardless of species, are controlled, leaf drop will not be so severe. It should be noted that light infestations of any one of the above-named mites can be a factor in causing leaf drop during the winter. Twigs that are defoliated during December usually die before the spring flush of growth and are a source of melanose infection next spring.

When checking for mites, inspect tree tops as well as lower parts of the trees. During cool weather, mites are usually more numerous on tree tops and the south and southeast sides of the trees.

Scale infestations may not be particularly heavy, but a light to medium infestation of purple scale on the twigs and around the stem-end of the fruit is a factor in causing fruit drop, especially during the dry winter months.

Purple and Texas Citrus Mite Control: To insure the maximum period of control as well as to free the trees of mites before injury develops, treatment should be made before over 20 percent of the leaves are infested with mites or mite eggs. Thoroughness of coverage is also necessary where contact insecticides are applied.

DN Dry Mix at 2/3 pound per 100 gallons has been used for many years. The maximum period of control has been obtained where this material was applied where there was a light infestation and not an abundance of eggs. DN Dry Mix can be mixed with wettable sulfur, but should not be mixed with lime-sulfur or other alkaline solutions. A DN-parathion mixture sometimes causes a leaf drop, and some injury may develop where a drop of spray dries on the lower half of the fruit, especially on early and mid-season oranges. A 1-1/2 percent DN-sulfur dust can also be used for light infestations, but it is not as effective as a spray. Fruit injury has not been observed following a dust application. Fruit should not be picked for 12 days after a DN application.

Systox at 1/2 to 1 pint per 100 gallons is effective and more suitable for heavy infestations than DN Dry Mix. This material is not known to cause any injury to fruit. The same safety precautions should be taken when applying it as with parathion. Systox can be mixed with wettable sulfur, but should not be used with lime-sulfur. Fruit should not be picked for 21 days after application.

Ovex at 1 pound per 100 gallons can be used only in groves where it has not been applied during the year because mites become resistant to it after about two applications. Ovex does not kill the older mites, and is slow to give control, but it is effective where mite eggs are abundant. The addition of 1/2 pound of 15 percent parathion or 1/4 pint of TEPP per 100 gallons will kill the active mites. If scale is also a problem, the amount of parathion can be increased to 1.7 pounds per 100 gallons. Ovex may also be mixed with lime-sulfur and wettable sulfur. Fruit should not be picked for 14 days after spray.

Aramite 45W at 2/3 pound per 100 gallons can be used for light infestations. No injury to fruit has been observed where this material was used with wettable sulfur and parathion. Aramite should not be mixed with lime-sulfur or other alkaline materials. Fruit should not be picked for 15 days after application.

Rust Mite Control: Rust mite control is as important in the winter as it is in summer. One gallon of lime-sulfur plus 5 pounds of wettable sul-

(Continued on Page 33)

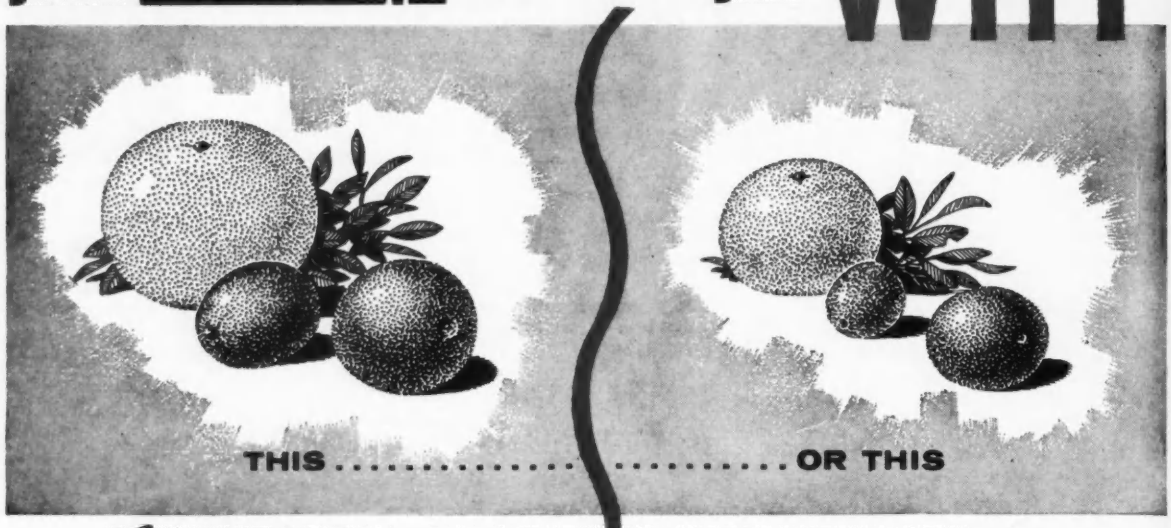
SCALE AND MITE ACTIVITY BY DISTRICTS*

District	Purple Scale	Red Scale	Purple Mite	Rust Mite on leaves	Rust Mite on fruit
West Coast	4.25	0	1.23	3.00	2.85
Indian River	3.68	2.39	1.26	3.09	2.80
Upper East Coast	4.42	2.92	2.14	2.14	1.43
Gainesville	2.49	.50	0	1.50	1.50
Orlando	3.67	2.34	1.05	1.47	1.29
Brooksville	3.04	.19	1.66	2.08	2.75
Ridge	4.58	3.92	1.34	2.82	2.62
Bartow	4.41	.89	1.51	3.50	2.76
State Average	3.92	2.81	1.29	2.46	2.28
Last Year	3.63	3.00	1.14	1.91	1.66

* Fourth week in November. Activity is computed from populations, amount of hatching of scales, and number of groves with increasing or decreasing infestations. Activity is considered high if above 4.0 for purple scale, 3.0 for red scale, and 1.5 for mites.

*Written November 26, 1957. Reports of surveys by Harold Holtsberg, Fort Pierce; J. W. Davis, Tavares; K. G. Townsend, Tampa; T. B. Hallam, Avon Park; and L. M. Sutton, Lake Alfred.

your citrus crops can show you WHY



International
RAINBOW®

makes the BIG DIFFERENCE

... because it's Premium Plant Food. Rainbow is the ideal balanced mixture of all the nutrients your citrus crops need for:

- **Earlier maturing** oranges, grapefruit, limes.
- **Fruit containing** more solids and sugar.
- **Healthier trees** with greater resistance to disease and freezing.
- **Stronger stems** so your fruit stays on trees longer.
- **Fruit** with better shipping quality.

Every Ingredient in RAINBOW Serves a Purpose

For example, Nitrogen that's fast acting and Nitrogen that is slowly available during full growing season. Sulphur and Phosphorous for plant color, root and stem development and seed production. Water soluble Magnesium and Calcium for growth, health, strength. Potassium for sturdy growth, plus other important plant foods for maximum yields.

INTERNATIONAL FERTILIZERS

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

PLANT FOOD DIVISION . . . . . 20 NORTH WACKER DRIVE • CHICAGO 6, ILLINOIS

Plant Locations: Mulberry, Jacksonville, Pensacola, Florida

Contact These
RAINBOW
REPRESENTATIVES
for PROMPT SERVICE

District Sales Manager
GALLIE T. HACKNEY
P.O. Box 942
Ft. Pierce, Fla.

CENTRAL FLORIDA
Thomas H. Collins
Rt. 6, Box 654
Tampa 4, Fla.
Earl H. Crittenden
804 S. 7th St.
Ft. Pierce, Fla.
George W. Hammette
405 W. Robinson
Orlando, Fla.
Bryan E. Pennington
2200 St. Joseph Rd.
Dade City, Fla.
Harold E. Thompson
2931 Walnut, NW
Winter Haven, Fla.

SOUTH FLORIDA
Philip L. Crews
Immokalee, Fla.
Charles R. Johnson
Rt. 2, Box 385
Miami, Fla.
Joe C. Pennington
P.O. Box 674
Stuart, Fla.

NORTH FLORIDA
Charles E. Debolt
P.O. Box 527
Ocala, Fla.
Larry L. Leadholtz
505 E. Broadway—Apt. 4
Ocala, Fla.
David W. Maxwell
P.O. Box 227
Lake City, Fla.
George H. Richardson
P. O. Box 3072, M.S.S.
Tallahassee, Fla.
Jess V. Smith
9th Avenue
Windemere, Fla.

NORTHWEST FLORIDA
J. C. Beasley
P.O. Box 55
Opp, Alabama
S. M. Lufkin, Jr.
102 Ashley St.
Atmore, Alabama

Per Capita Consumption Of Citrus On Down Grade

A top Florida citrus industry research official recently expressed "alarm" over the reduction in per capita consumption of citrus fruits, throughout the nation, and called on the industry to look for new ways to stimulate demand for the products.

Dr. L. G. McDowall, director of research for the Florida Citrus Commission, and one of the men credited with discovery of modern frozen citrus concentrate processes, said, "We here in Florida sometimes tend to overlook the fact that we have been able to profitably dispose of our production gains of recent years only at the expense of other citrus areas. He spoke before the Southeastern Chemurgic Council meeting in Lakeland.

"It is alarming to me that per capita consumption of citrus fruits has decreased in the past ten years," he said. "Actually during this period, over-all per capita citrus consumption has fallen about 10 per cent."

Other fruit and vegetable crops, he said, have increased their usage.

"This situation must not be allowed to continue," Dr. McDowell pointed out. "We must stimulate demand so that over-all per capita consumption is increased."

He offered several suggestions for increasing demand.

"One, lower prices," he declared. "This was demonstrated this past Spring and Summer . . . I don't think any of us wants to consider this alternative, especially in face of rising production costs."

A second, and more practical method, would be to give the consumer better and more uniform quality products, he pointed out.

"This is an area in which we can make great progress. I think the time has come to admit to others, as we do to ourselves, that not all of the oranges and grapefruit we produce are of the quality that the consumer has a right to expect. Too many of our good quality oranges and grapefruit are being used to upgrade those of lower quality," he stated.

As to fresh fruit practices within the citrus industry, Dr. McDowell emphasized that each grapefruit should equal or exceed maturity standards, and that appearance of fresh oranges be improved.

"This year, the Commission and the Citrus Experiment Station have embarked on long range fundamental research on this problem," he said. "We want to know what causes color to develop or not develop in oranges."

With regard to processed products, he suggested that perhaps higher grades should be considered. He specificially singled out frozen orange concentrate.

"Over 98 per cent of it is now marketed as Grade A," he stated. "Does this mean that all of it is of excellent quality or does it mean that the grade is too lenient?"

If a super grade were established for the product, he hinted, perhaps the industry could obtain a "preminium" for it.

He said that new forms of citrus products would probably be developed, but until they do, "we should strive to broaden our present markets as much as possible." He also suggested that school children be exploited and that the industry "even consider aa pool of frozen concentrated orange juice for this purpose — the contents of which would be made availbale to the schools at a guaranteed price over long periods of time."

He called for continued efforts to prevent abuse of frozen products in the channels of trade and in the hands of the housewife, and more emphasis on convincing the American public of the health benefits of citrus. Pricing, he admitted, was a ticklish problem.

"I think we need a method or means of stabilizing prices at a fair level," he stated. "Certainly the problem of expanding sales of processed products could be simpler if the larger buyer had some assurance that the price of his purchase today would not be undercut tomorrow."

He referred to the Citrus Commissions recently appointed Plans Committee summarizing their objectives by saying, "They are going to try to anticipate the future as intelligently as possible, and if corrective measures seem called for, start to take steps now rather than wait until a bad situation is upon us." He added, "This is precisely the type of fundamentaal planning that is long overdue in our industry."

Why Should YOU Insist On Quality Nursery Stock?

When a grower buys a nursery tree, he is not buying just a tree. He is buying a plant on which to grow a crop of fruit in future years. To get the quantity and quality fruit he desires, he buys a nursery tree of a certain variety on a certain rootstock. If the source of the tree's rootstock and budwood are questionable, he may have just a tree and never see the quantity and quality fruit produced which he thought he was buying.

There Is No Substitute For Quality

That's why Lake Garfield takes extreme care in selecting its rootstock seed and budwood — and then gives its stock the best of training, care, and handling until the tree is safely delivered to the customer. We insist on growing quality nursery stock. Growers should insist on buying quality stock since there is no substitute for quality in nursery or grove.

Place Your Order Now For Lake Garfield Quality Stock

Experienced growers know the importance of placing orders early, and we now have orders for many thousands of trees. The demand for LAKE GARFIELD trees exceeds the supply in many varieties every year. We can furnish for Spring planting Hamlins, Pineapples, Valencias, Lue Gim Gongs on rough lemon root, Pineapples and Parson Browns on sour root, Hamlins, Navels and Temples on sweet orange root, and Temples on cleo. All Lake Garfield nursery stock is grown on virgin land free from burrowing nematodes.

WE ALSO HAVE A LIMITED QUANTITY OF CERTIFIED TREES AVAILABLE

Lake Garfield Nurseries Co.

Office: 230 Summerlin Street
North of Post Office

Telephones: Day — 2-4601 or 3-4601
Night — 3-0461 or 2-5511 or 3-1451

P. O. Box 154-T : Bartow, Florida

The Citrus Industry
EXCLUSIVE SPECIALIZED CITRUS PUBLICATION
Issued Monthly
Representative of every interest
Representing no special interest

Publication office at Bartow, Florida. Entered as second class matter February 16, 1920, at the post office at Tampa, Florida, under act of March 3, 1879. Entered as second class matter June 19, 1933, at the post office at Bartow, Florida, under act of March 3, 1879.

The Two Medfly Eradication Programs In Florida

Since this paper was presented at the annual meeting of the Florida State Horticultural Society, two minor infestations have been discovered but are being quickly eradicated. They do not detract from the general trend of Mr. Ayers' paper.—Editor.

In all the history of the world's agriculture, the Mediterranean Fruit Fly has been eradictetd but twice. And, to the everlasting credit of state and federal personnel who devoted time and talents to the campaigns, both eradictions occurred in the State of Florida.

Very few complete eradications of any plant pest or disease ever have been effected anywhere, which makes the accomplishments in Florida even more estimable. Only the perfect cooperation and coordination of state and federal plant pest control forces could have attained these two outstanding successes.

There was a decided similarity in the two programs, other than the outcome.

To begin with, the Medfly was discovered in the state each time during the month of April. And approximately 18 months of control and regulations were sufficient to eradicate the insect.

The first invasion of the Medfly was discovered April 6, 1929, and the eradication ended with the lifting of all quarantine regulations on October 30, 1930.

ED L. AYERS
COMMISSIONER
STATE PLANT BOARD
OF FLORIDA
AT MEETING FLORIDA
STATE HORTICULTURAL SOCIETY

The second invasion was noted on April 13, 1956, and quarantine restrictions are scheduled to end on December 16, 1957.

The second outbreak can be considered as completely eradicated at this moment, since no trace of the Medfly has been found since mid-September, and that find was only one of four reported since last June.

Despite this note of optimism, state and federal forces will continue to be on the lookout for the Medfly and any other fruit fly dangerous to the agricultural security of Florida. Trapping, which played and continues to play an important part in eradication, will be continued as a regular part of the State Plant Board's inspection program. Each and every gain in the world's transportation system does much to break down the barriers which might otherwise confine these insect pests not native to Florida and the United States.

To return to the two infestations, both made initial appearances as maggots in grapefruit. The first trace of the Medfly was uncovered in 1929 when a State Plant Board inspector noticed a heavy larval concentration in grapefruit picked in the Orlando area. And in 1956, a resident of Miami contacted the county agricultural agent's office for information about larvae found in a dooryard planting of grapefruit. In each instance, the dispatch of larval specimens to state and federal identification laboratories brought back the thundering announcement that the Mediterranean fruit fly had invaded Florida.

And in each instance, state and federal plant pest control experts

were shepherded together to begin planning for eradication of the invader.

Despite these obvious similarities, there were some distinct differences in the two outbreaks. The 1929 invasion came near Orlando, in the heavily planted citrus area. The 1956 infestation broke out in Miami, a large residential and resort area. Whereas eradication efforts in the first fight were concentrated on a rural division of the state, with its heavy agricultural holdings, the second campaign hit hardest at urban areas and unlimited dooryard plantings of a great variety of host plants.

The first program was based on a veritable "scorched earth" policy in which host plants and produce were destroyed in eliminating possible breeding spots for the Medfly. A huge field force in excess of 5,000 men was needed to carry on this program gathering host fruits and vegetables, uprooting many host plantings and spraying host trees with a baited insecticide.

In the first weeks of the most recent campaign, while experts were huddling over their planning boards, the principles of the 1929 program were resurrected briefly. Actually, the antiquated system of gathering host fruits and vegetables and of spraying host plants and trees with ground equipment was thrown into the struggle as delaying action, in contrast with the first campaign, where enormous amounts of fruits and vegetables were destroyed. Fumigation and quarantine ultimately allowed the movement of practically all Florida's marketable produce.

Within two weeks the 1929 campaign had been forgotten and lost completely in the light of a new eradication era. Spraying went into the air with the decision to make applications with aircraft. This not only permitted complete coverage of the huge infested area which covered south and central Florida but spared expense which could have been required for a ground spray program.

In addition, trapping came into its own with more than 50,000 plastic traps being spread over the state in a gigantic survey program. At the start of the 1956 campaign, a few thousand glass traps failed to do the job properly and a United States Department of Agriculture fruit fly expert solved the problem by devising the much cheaper and more efficient plastic model.

By way of comparison, state and federal appropriations for the first campaign totaled roughly $7,000,000, while the second program was financed by an appropriation of $10,000,000, state and federal governments, furnishing $5,000,000 each; and $100,000 in addition was supplied by Nathan Mayo, Florida State Commissioner of Agriculture, from his inspection fund.

The difference in techniques permitted a task force of less than 800 to accomplish eradication in this fight, as compared with approximately 6,000 employees in the 1929 campaign.

There also was a great variance in the number of traps used, a total of 12,645 in the first fight against a top of 50,267 this time.

This meant a much greater coverage, since the 1929 invasion moved into 20 counties, as against the 28 counties infested by the 1956 invader.

This spread might have been greater but for a system of roadblocks used in both campaigns to limit the movement of infested plants and produce. National Guardsmen manned many of the blocks in 1929, the only known instance wherein a National Guard in any state participated in a quarantine program.

Roadblocks uncovered several tons of host fruits and vegetables in checking more than 4,000,000 motor vehicles in the 1956 fight. Road patrols were substituted for this form of inspection once the peak of the program had passed.

Importance of roadblocks and quarantine can be noted in the fact that the Medfly managed to get out of Florida and into at least seven other states. A thorough inspection of host materials in these states disclosed 17 shipments containing Medfly larvae.

No trace of the Medfly has been found outside Florida in the present campaign.

While no accurate record is available on the acreage sprayed in the first program, aircraft have covered a total of 799,757 acres one or more times to date in the second program. The aggregate total covered has reached 6,622,261 acres and spray activity at this moment is confined to 1,200 acres in Manatee County, the only infestation remaining. This aerial spraying is to conclude in two weeks and quarantine likely will be ended early in December.

Lead arsenate was the poison used in spray applied during the first campaign, with syrup, molasses and sugar as bait.

The mixture used in aerial spraying this time consisted of two pounds of 25 per cent wettable malathion, one pound of approved protein hydrolysate as lure, and enough water to compose one gallon of liquid. This was applied at the rate of one gallon per acre. The early formula used two pounds of the lure in the form of Staley Sauce Bait No. 2, while the modified mixture included Staley Sauce Bait No. 7.

Ground and air applications were made of dieldrin as a soil treatment for killing Medfly larvae entering the ground and in killing the adult fly emerging from the pupal stage. Recommended treatment was 50 pounds per acre of 10 per cent granular dieldrin 30-40 mesh.

Fumigation, which played an important part in permitting host fruits and vegetables to be shipped to markets, was accomplished by the use of ethylene dibromide and methyl bromide. The latter was used for some host vegetables at the rate of two pounds per 1,000 cubic feet for a period of 3 1/2 hours. In fumigating citrus, eight ounces of ethylene dibromide per 1,000 cubic feet for a period of two hours proved sufficient, while mangoes required 10 ounces of the same chemical and for the same area and duration.

With the gains illustrated in the most recent campaign and with the gains surely to come in the field of research, any future invasion of Florida by a fruit fly of any description likely can be treated as an isolated infestation.

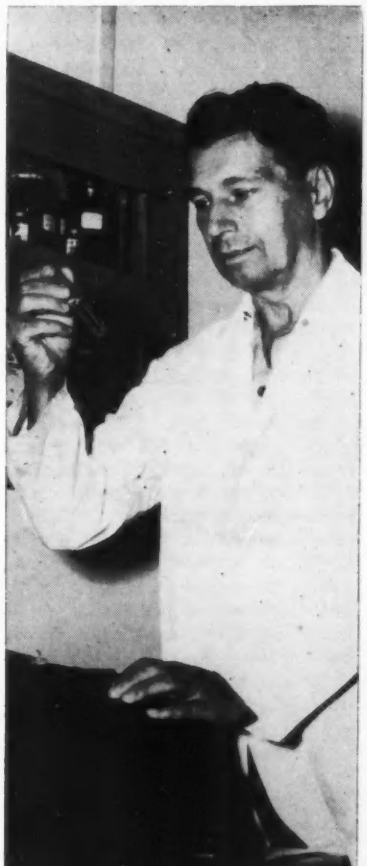
And with a continued trapping program, it is unlikely that a fruit fly would establish too much of a foothold in the state before being discovered.

A. J. SNOOK HEADS CITRUS PROCESSORS ASSOCIATION

A. J. Snook was elected president of the Citrus Processors Association for the coming year at the annual meeting of the Association in Miami Beach, Florida, October 10. Mr. Snook is associated with H. P. Hood & Sons and served last year as Chairman of the Advertising Committee for the Association. Other new officers elected were: R. W. Bennet, First Vice-President, associated with Florida Citrus Canners Corp.; J. Van Horn, Second Vice-President, associated with Minute Maid Corporation; C. C. Brown, Treasurer, associated with Shirriff-Horsey Corp., Ltd. C. C. Rathburn was re-elected as manager for the Association. James Coates of Adams Packing Association, Inc., was appointed Chairman of the Advertising Committee. W. H. Boswell, outgoing President presided at the meeting.

The Experimental Studies On Citrus Nematodes(*)

. . . By . . .
GEORGE RENNINGER AND



BORIS SOKOLOFF
(SOUTHERN BIO-RESEARCH LABORATORY, FLORIDA SOUTHERN COLLEGE, LAKELAND)

Although the plant-destroying nematode was discovered in 1743, very little attention was paid to it for many years to come. By now, the nematologists suspect that the worm was responsible for destroying two civilizations: the Mayan in Mexico and the Khmer in Indochina. The nematode is accused of costing the American farmers of today a tenth of all their growth. It has cost a single citrus setup in California more than $1,000,000 and it ravaged one million acres of vineyards there. It was estimated that the nematode is costing California's farmers alone, crops worth about $200,000,000 a year.

The golden nematode of potatoes can destroy 90 per cent of a potato crop as was the case in Holland and Denmark, as well as in Long Island, New York state. All the experience of nematologists has proved the enormous obstacles one meets in an attempt to completely destroy nematodes in an infected area, by means of chemical sprays, particularly the citrus nematodes which live 8-12 feet below the surface. We are confronted with the peculiar biological cycle of plant nematodes and their extraordinary capacity for survival. If only one nematode is left alive in an infested grove, in a decade or two, there might be more than 3,000,000 worms to the cubic foot, all descendents of the lonely survivor. Thus fully realizing the enormity of the problem one meets in an attempt to destroy citrus nematodes, **we would like to make clear that in no sense should our findings be considered as a solution to this grave problem.** The purpose of this paper is merely to report certain data, of an experimental nature, collected by us during the last three years, and which might give some new leads for successful control of spreading decline in the state of Florida.

— — —

In 1952 and the following years, several papers by Toyomizu **et al** (1, 2, 3, 4, 5, 6) of Kyushu University, Japan, appeared regarding the antibiotic, specifically the antifungal, activity of fish oils. Intrigued by this discovery, our laboratory initiated an investigation along the same lines, testing crude fish oils first and later on the various fish oil compounds. We have confirmed the findings of the Japanese scientists, noticing however, that antifungal activity of crude fish oils was relatively moderate. In order to increase the activity of crude fish oils, they were combined chemically with hydride salts. Subsequently, the so-called "hydrogenated fish oils" prepared by us were tested on various citrus fungi, **in vitro** as well as **in vivo**, on orange seedlings, with encouraging results. The compound when used in a 1 or 1.5% water suspension was found non-toxic to the seedlings and effective against citrus fungi, after two sprayings (7).

Fish oils are a rich source of unsaturated and saturated fatty acids. For a number of years it was known that some fatty acids, both unsaturated and saturated, of vegetable origin were effective nematicidals. Kofoid and White (8) and Chitwood (9) used undecylenic acid against eggs of the root-knot nematode, **Meloidogyne incognita.** Smith and Taylor (10) confirmed these findings by exposing **in vitro** the root-knot eggs to the action of this acid. More recently, Tarjan and Cheo (11) tested a number of fatty acids, mostly saturated, on various fungi. They concluded that "certain fatty acids in the intermediate carbon numbered group have been found to possess exceptional nematicidal activity. Hetanoic, caprylic, pelargonic, capric and undecanoic acids were found to be toxic to **Panagrellus redivivus** within a few minutes when these nematodes were tested **in vitro** at concentrations of 1000 p.p.m., and undecanoic acids were effective when cyst-infested burlap was dipped in 2 percent concentrations, only the former resulted in complete control when applied as a spray to cyst-infested surfaces."

The hydrogenated fish oils prepared by us were tested on citrus nematodes. The compound exerted certain nematicidal activity as shown by our experiments **in vitro** in a glass, and **in vitro** by spraying the surface of the soil. The field tests conducted with hydrogenated fish oils in water-suspension were rather discouraging. Examining the causes of this failure and checking the penetration of the compound through the soil, it soon became clear to us that since hydrogenated fish oils were in the form of a water suspension, there was no uniformity in their dispersion in the soil when its surface was sprayed with them. Thus we were confronted with the problem of transforming water-insoluble hydrogenated fish oils into a water-soluble form. The present report concerns this type

(*) Read at the Annual Meeting of the Florida State Horticultural Society, Citrus Section, October 31, 1957, Miami, Florida.

Aided by The Florida State Plant Board and the Maxine Ford Fund, New York, N. Y.

of compound which we have been using in our current experiments.

The Prerequisites to the Experimentation

The whole problem of spreading decline was reviewed in the light of what is known about the biology of **Radopholus similis** (Cobb) Thorne: the fact that the nematodes live 6-12 feet below the surface; that their egg stage is very resistant to any unfavorable environment; that due to their burrowing habits they are partially protected by plant roots; in view of all this, we postulated the following prerequisites for a potentially effective nematicidal compound.

The compound should be water soluble in order to assure the uniformity of soil penetration.

It should be non-toxic to plant tissue at a concentration of 1 or 1.5%.

It should be detrimental to all nematodes placed one or two feet below the surface sprayed two times at a concentration of 1 or 1.5%.

The compound should be inexpensive since repeated sprayings are necessary for a complete annihilation of nematodes in an infested area. We figured out that the cost of such a compound should be in the limit of 25-27 cents per pound.

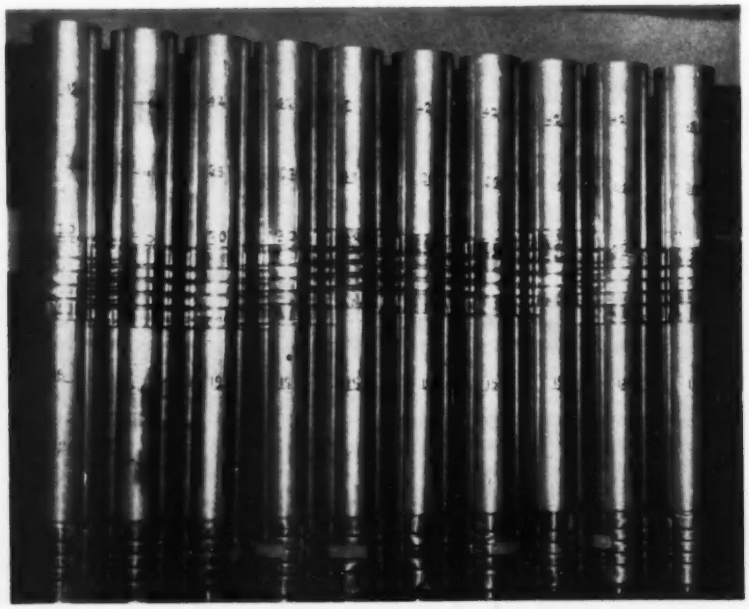
And last, construction of a pumping sprayer through which the compound could be "pumped" 7-12 feet below the surface was considered as essential for this project.

This in brief has been the goal of our study, a goal which is only partially achieved by us.

The Method of Testing

Numerous chemicals, among them some fatty acids, kill nematodes when tested **in vitro** in a watch glass. We used this method of direct application of a compound only as a preliminary test, in order to find its minimal lethal dosage. The actual experimentation was done in what one may call a **pilot testing plant.** This plant consists of ten cylinders, 44 inches tall and 6 inches in diameter, which are filled with soil up to 42 inches high.

In our more recent tests, we increased the number of cylinders to 12. Eight of them serve for testing the compounds and four cylinders are used for control. We started testing with cylinders filled with soil up to 6 inches. Nematode infested roots are placed in the bottom of the cylinders, which have perforated bottoms. The roots are covered with six inches of soil taken from the same area the roots were taken from. The compound is sprayed directly on the surface of the soil and allowed to leach through to the roots. After 24 hours, a second spraying of the compound is applied. The roots are allowed to remain in the soil for additional 48 hours at which time they are removed, washed and placed in separate labeled jars. The water is added to the jars with roots to nearly cover them. Lids are placed loosely on the jars and the roots are incubated in the water for 72 hours at room temperature, which is about 25-26° C. At the end of the incubation period, the roots are shaken in the water, poured into a 100 mesh screen which drains into a 325 mesh screen. The roots are flushed with fresh tap water and the nematodes are collected on the 325 mesh screen. The collected nematodes from each cylinder, four controls and eight treated, are placed in equal volumes of water and 10 aliquot samples are taken from each for determination of the effectiveness of the compound by counting all living nematodes in each of 120 aliquot samples. The number of living nematodes are compared with the controls that have been processed in the same manner as the treated cylinders with plain water being used in place of the compound during the leaching processes.



The Material

In the first stage of our experiments, we used the water-soluble hydrogenated fish oil alone. The compound was labeled FOAH. After testing various concentrations of this compound on the nematodes, we found that 1.5% of it possesses a sufficient nematicidal activity, and there was no necessity in increasing the concentration of FOAH. In the course of testing this compound, we found that a small number of nematodes, about 8-10%, as compared with the controls escaped the action of FOAH, and remained alive after its application. Thus in our more recent testing we used a **combined** treatment. For this purpose we chose piperazine citrate, which is known as an effective remedy against the nematode infesting man's intestine, and combined it with hydride salts. It is non-toxic and induces a shock-line condition in nematodes (12, 13, 14, 15).

The procedure of the treatment was as follows:

100 ml. of 1% of piperazine citrate hydride in water solution was poured on the surface of the soil, 6 inches in diameter and 6 inches in depth in eight cylinders. Two hours later, 100 ml. of 1.5% hydrogenated fish oil (FOAH) was sprayed on the same surface. Twenty-four hours later, the same procedure was repeated. The control cylinders were sprayed with plain water (200 ml. each application). After 48 hours, the roots were incubated and the number of living nematodes, both in control and treated jars were counted. The Table gives the average figures for four series of tests, 16 control jars, each of 10 aliquot samples, and 32 treated jars, each of 10 aliquot samples.

These figures show that a small number of nematodes, 3.25% as compared with controls escaped the action of this combined treatment and remained alived. While the control cylinders showed an average of 168.2 nematodes alive, the treated cylinders had 5.5 nematodes alive.

The experiments with the soil six inches deep were repeated in cylinders filled with soil up to 42 inches

deep. The technique was the same as in the above described tests, except the amount of solution sprayed on the surface was increased accordingly. The interesting feature of these last tests was that the number of survived nematodes in the treated cylinders was somewhat smaller when compared with the figures in the Table. As a rule, the total number of nematodes remaining alive in all eight cylinders was 1-2 nematodes, while those in the control cylinders numbered between 100-150. In many treated cylinders, no living nematodes were detected. Apparently the larger amount of hydrogenated fish oil sprayed on the surface accounts for these favorable results. All in all we may say that this treatment in its present form **is not one hundred per cent effective,** and that a small percentage of nematodes, about 0.75% remain alive, as compared with the controls. However, we hope that with further improvement and modification of this method, we might be able to reach our goal of complete destruction of nematodes in the pilot plant tests.

TABLE
THE EFFECT OF HYDROGENATED FISH OILS (FOAH) AND PIPERAZINE CITRATE ON CITRUS NEMATODES

Average figures for:
16 control jars or 160 aliquot samples
32 treated jars or 320 aliquot samples
The cylinders filled with soil six inches deep.

	Number of Nematodes Alive Average
Control cylinders; sprayed with 200 ml. plain water, for two consecutive days	168.2
Treated cylinders; sprayed with 100 ml. 1% solution of piperazine citrate and two hours later 100 ml. FOAH, daily for two consecutive days	5.5
Average percentage of survival in the treated jars as compared with the controls	3.25%

Toxicity of Hydrogenated Fish Oils

1 and 1.5% dilution of hydrogenated fish oils was tested on citrus seedlings. Both leaves and soil around the seedlings were sprayed two or three times at an interval of 8-10 days. As we reported previously (7), no toxic effect was observed. Not only did the compound exert an antifungal activity, but the seedlings themselves seemed to benefit from this treatment, growing faster, as compared with the control not-sprayed seedlings, possibly due to the nutrients present in fish oils.

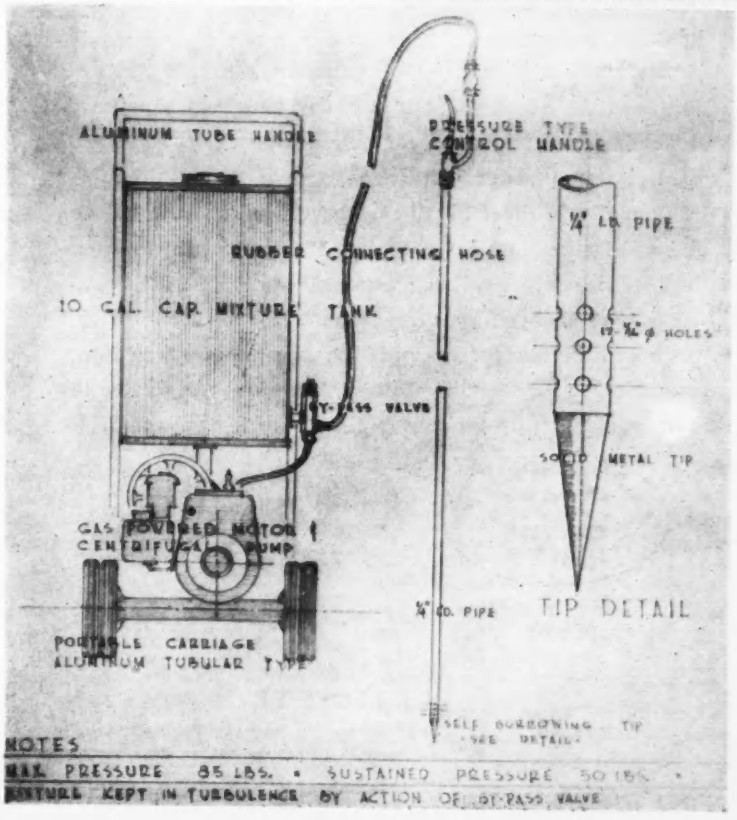
The Mechanism of Action of Hydrogenated Fish Oils

Much attention was given by us to the question: why do hydrogenated fish oils exert nematicidal action? Various vital stainings were used, including lithium-trypan blue and Lithium-pyrrol blue. We have not as yet arrived at any definite conclusions in this respect but there is some cytologic evidence collected by us and based on the peneration of vital dyes such as Lithium trypan blue and Lithium pyrrol blue that hydrogenated fish oils might interfere with the oxidation processes and respiration of the nematodes and that this compound possibly kills them by suffocation.

The Pumping Sprayer

The pumping sprayer was designed and constructed by Engle Electric Company of Lakeland, according to the specifications of its president, Walter E. Engle. Photo II shows the pumping sprayer operated by its inventor and constructor, Mr. Engle. Photo III gives the blue print of the sprayer. The tank with a capacity of 10 gallons is filled with hydrogenated fish oils. A gas powered motor of a centrifugal pump type is used to force the compound into a rod. The maximal pressure is 85 lbs. and the sustained pressure, 50 lbs. The rod is divided into three sections. One section is connected to the tank and is equipped with a pass valve and a manual pressure type control to release the fluid into the soil. The overall length of the rod is 13 feet.

(Continued on page 18)



playmates rides.—(AP Wirephoto).

FOR HIGHER PROFITS—

Citrus Men Urged To Aim For Quality In Appearance And Taste Of Their Fruit

By JACK NEASE
Tribune Staff Writer

LAKELAND, June 22.—Florida citrus growers will make more money in the long run if they raise fruit which can be sold in either fresh or processed markets, they were advised last week.

plant picks a crop of fruit and packs only 50 per cent of it, it has to get 30 cents per box more for the packed box in order to offset the harvesting and handling losses on the unpacked portion.

Cites Market Visit

"On a recent trip to a num-

(Tampa Sunday Tribune, June 23, 1957)

According to most current thinking, future profits will depend on both external and internal quality of your fruit. It makes good sense, too, because eye-appeal has proven necessary for maximum price on the fresh fruit market, and new buying habits of both processors and the fresh fruit market are keyed to internal quality.

Naturally, top-quality fruit depends on proper fertilizing with the finest you can buy, spraying with the most dependable pesticides you can obtain and taking advantage of the latest, proven scientific advances in cultural practice.

Since 1893, *Ideal* Fertilizers have been considered the finest, because they have always contained nitrogen from high-grade sources such as Peruvian Guano. FASCO Pesticides have always meant *dependable* control. Your W&T Representative keeps up with the latest, proven cultural practices, so give him a call today. He's at your service to help you travel up the new highway to higher profits.

IDEAL FERTILIZERS
AVAILABLE WITH
GENUINE
PERUVIAN
GUANO

IDEAL FASCO

FLORIDA AGRICULTURAL SUPPLY COMPANY

WILSON & TOOMER FERTILIZER COMPANY
Plants in Jacksonville, Tampa, Cottendale, Port Everglades
GENERAL OFFICES • JACKSONVILLE, FLORIDA

CITRUS COMMISSION PROTESTS COST RESULTS

The Florida Citrus Commission, continuing its campaign for more realistic pricing of Florida citrus and products in eating places within the State, has called on hotels, restaurants and motor courts to feature citrus at "reasonable" prices.

In letters to the Florida Hotel Association, Florida Motor Court Association and Florida Restaurant Association, General Manager Homer E. Hooks set a dual goal for citrus: Get it into every Florida eating place and price it reasonably. He said "the benefits will be tremendous to all concerned."

The Commission recently protested the 25 cents per six-ounce serving of orange juice being charged by concessionaries along the Sunshine State Parkway. As a result, Thomas Manuel, chairman of the Turnpike Authority, acceded to the Commission's request and had the price reduced to 10 cents.

"During the winter season, and the balance of the year as well, we get a lot of mail here at Citrus Commission headquarters from our winter visitors and from home folks, too," Hooks said. "I would say that most of this mail centers on two complaints: One, the absence of Florida orange juice at many eating places in the State of Florida; and two, the frequent high price charged for servings of this juice where it is available —often as high as they pay at home in the North."

Hooks offered the services of the Commission's merchandising staff stationed in Florida to assist "in setting up displays, advising the proprietor on getting the most out of citrus sales and menus, and helping in any way to promote our Florida citrus fruits and products." He stated that every eating place in Florida should serve orange juice daily in some form—fresh, canned, frozen or chilled. Other citrus juices as well as fresh fruit, in season, should be available also, he added.

Referring to the Turnpike's decision to reduce prices in restaurants operating along that artery, Hooks said "this wise move will result in the sale of a great deal more orange juice and the development of much more good will on the part of visitors and patrons along the Turnpike than was the case when they had to pay the 25-cent price."

Based on present fruit and juice costs, he added, "besides the public relations factor involved, the 25-cent price was entirely too high."

The Department of Fruit Crops Of The University of Florida -- Its Organization And Objectives

The division of the former Department of Horticulture of the University of Florida has resulted in the establishment of four new departments which will tend to serve major industry groups. Food Technology and Nutrition, Ornamental Horticulture, Vegetable Crops and Fruit Crops were established as separate departments.

The Department of Fruit Crops is responsible for teaching, extension, and research in all areas related to fruit crops.

Teaching

The Fruit Crops' teaching program has been reorganized into four curriculae and now includes "citrus production," "citrus packinghouse management and marketing," "tropical and subtropical fruits" and "fruit crops research." Under the University College program which has been in operation at the University of Florida since 1935, students are not classified as agricultural students or majors in Fruit Crops until their junior year. During their first two years, they are considered "University College" students and 64 credit hours are required in this category. To strengthen the freshman program and give it more specific direction, Fruit Crops' students are not required to take the University College courses in physical (C 21 and 22) and biological (C 61 and 62); in their place is substituted six hours of general botany (Bhy 101 and 102) and eight hours of general chemistry (Cy 121 and 122). All students are required to take eight hours of "English," dealing with the fundamentals of reading, speaking, and writing; eight hours of "Americanism Institutions" designed to interpret the interrelated problems of religious, educational, social and economic institutions in our American way of life; eight hours of "Humanities" for developing an appreciation of music, the arts and great literature, and eight hours of combined instruction in logic and mathematics. These courses are taken during the freshman and sophomore years regardless of interest or area of specialization in which the student is interested.

(1) Horticulturist and Head, Department of Fruit Crops, University of Florida.

JOHN W. SITES(1)
AT MEETING FLORIDA STATE HORTICULTURAL SOCIETY

Using the curriculum for a major in "citrus production" as an example, the student will be required to take in addition to the above named courses, agricultural biochemistry, plant physiology and economic entomology plus six hours of approved electives during the first two college years. As a junior and senior, fundamental courses in support of the major are required, in soils which deals with the nature and property of soils, general principles of soil fertility and the use and formulation of commercial fertilizers, entomology in study of identification, life history and control of Florida's fruit insects; pathology in studying the diseases of citrus, their diagnostic characteristics and control; agricultural engineering which deals with the fundamental principles of drainage and irrigation and the operation and care of farm motors and equipment; agricultural economics to study marketing of citrus fruits and methods of taking inventories and keeping financial records. These are some of the supporting courses to the student's major objectives in the study of citrus production. In the major field, which includes at least twenty-two hours (or about one-third) of the upper division work, the student receives training during his junior year in botanical classification, characteristics and identification of varieties, the operation of a citrus nursery and the care of a young grove, including a study of rootstocks, and scion varieties, methods of propagation, bud transmission problems, nursery stock certification and handling of the grove during the first four years. This is followed during the senior year by intensive courses in citrus culture dealing with fertilization, irrigation, cultivation, pruning, frost protection and grove rehabilitation; the physiological principles underlying the production of fruit crops and the maturity and grade factors affecting the market quality of citrus fruits as well as the laws regulating their shipment and sale. Within the past year, the citrus teaching program has been increased in number and scope of courses and new curriculae in packinghouse management and marketing and fruit crops research have been added. The packinghouse management and marketing curriculum, in contrast to the "production" curriculum, places the emphasis of supporting courses in accounting, business management, cooperative and technical marketing and increased emphasis upon packinghouse procedures and management; the research curriculum places the emphasis on a better background in mathematics, physics, chemistry and plant physiology. We feel very substantial progress has resulted to date from the reorganization of the citrus teaching program.

Extension

Although the extension program is administered through the office of the Director of the Extension Service, the Department of Fruit Crops is responsible for subject matter in this field. Under the leadership of the citrus specialist, a very fine extension program is presently in operation as manifested by their leadership and participation in the various citrus seminars and other similar programs presented each year, the farm and home development programs for many of the major citrus produc-

(Continued on page 29)

Some Future Problems And Future Possibilities In Florida's Agriculture

As They Relate To The Facilities And Staff Of The Florida Agricultural Experiment Stations

J. R. BECKENBACH
DIRECTOR
UNIVERSITY OF FLORIDA
AGRICULTURAL EXPERIMENT
STATIONS

AT MEETING FLORIDA STATE HORTICULTURAL SOCIETY

I would emphasize the word "Some" in my title, since I cannot pretend to be in any way complete in a talk of this nature. You will note, too, that I am restricting myself to the state research units. In so doing, I am not belittling the past, present or future research of the U. S. Department of Agriculture, the University of Miami or of other fine research institutions here in Florida. I am only limiting the scope of my talk to our State Stations because I know where we stand in this picture.

While I am beginning to warm up to my topic, I will digress briefly to comment on "duplication" in agricultural research. There has been a considerable to-do about wasteful features of such duplication in the past several years, both at national and state levels. Distinguished senators have declared about it in Appropriations Committee hearing; Legislators have done the same in Tallahassee. So I run a considerable risk in taking the other point of view — I maintain that duplication is more apparent than real in agricultural research. I further maintain that a little competition in research is a wholesome thing — especially when early publications of results is required, and mutual respect exists among personnel. I welcome the programs of the U. S. Department of Agriculture and other agencies in the agricultural research picture here in Florida. I believe that the growers are better served because our programs are mutually stimulating. Many laboratories worked on the polio vaccine; if Dr. Salk had been told to work on chicken pox because another laboratory was working on polio, we might still be having epidemics of polio.

Actually, we have a sort of built-in protection against the possible hazards of unwarranted duplication. Other public agencies do, too. Each publishes an annual report of research accomplished, for one thing In addition, all of our research is conducted under formal project statements which must be approved in my office. Copies are then filled as information in the State Experiment Stations Division of the Agricultural Research Service, U. S. Department of Agriculutre, in Washington. While these are not made directly available to the USDA research people, personnel in the State Experiment Stations Division office also have access to the USDA project outlines. One of their functions is to inform the State Stations and the USDA if and when apparent duplication develops. In practice, this tends to coordinate programs and to get the researchers together if they have mutual interests. Quite often it results in two or more researchers or research teams attacking the same important problem with two or more research approaches. This is not unwarranted duplication, but exemplifies the stimulating competition previously mentioned.

In getting into my topic, I'm going to talk first about some agricultural possibilities here in Florida. After twenty years here I don't hesitate to say that it is these possibilities that really stimulate me. While I believe that our research people do a very fine job in the problem solving department, the sort of contribution that really "sends" me is the introduction of sweet corn as a major crop here in Florida, or the development of citrus concentrate, or the introduction of White Dutch clover to our pastures, or the introduction of a tomato variety that makes possible our new "pink" tomato deal.

Grape Industry

To lead off with, we have one foot in the door toward a future important grape industry for Florida. For a commercial grape, our Lake Emerald grape has poor color, and only fair quality. Nonetheless, it foretells the time when we will have high quality purple grapes in profusion, with some red and white ones for variety. Now that we know that we can breed varieties resistant to Pierce's disease — which practically eliminated quality grapes from Florida years ago, the horizon is unlimited. Our grape industry can someday expand over almost as much of the state as is now infested with wild grapes. I invite all research agencies and individuals to join in the fun of producing these varieties to-be. I believe that grapes loom large in Florida's future.

More To Come

Before I move away from fruits, let me mention a few more that will be here, and will be important. Peaches, blueberries and blackberries are now on the way for Central and North Florida. Mangoes, lychees, avocadoes and who knows what additional sub-tropical fruits will fill the future niche in South Florida. All in all, it seems logical to me that the next new agricultural developments in Florida will probably be with fruits other than citrus.

In our important vegetable deal, we have a reasonable mature but high-risk industry, which continues to make solid progress. Our part in this now, and for the foreseeable future, is to carry a research program that keeps chopping away at the "high-risk" factor. We try to carry a balanced program of long-range and short-range research. Our short-range research program is largely based on urgent production problems, although we have some utilization research and marketing research going, also. Our long-range program is largely in the area of breeding for disease and/or insect resistance, keeping in mind other important factors such as yield and quality. Each time we make progress in the disease or insect control work, we can place a little stronger emphasis on the breeding work. Over time, we are increasing the proportion of long-range research. In this long-range program we are also doing some work on biological control of some insect pests which have not proven amenable to chemical control measures. Perhaps a way of describing this would be to say that emergency control work has top priority, but that this has eased off slightly in recent years.

Citrus, Most Important

Citrus, of course, continues to be

the most important agricultural enterprise of the state. Spreading decline continues to be the most urgent problem, and we are working on this from as many angles as seem to have any promise at all. I am sure that up-to-date reports will be given in the Citrus section. Together with the personnel provided by the Citrus Commission, we carry a well-balanced program with citrus, to the best of my knowledge. We certainly intend to keep it so, but are always open to suggestions relative to problems of the industry.

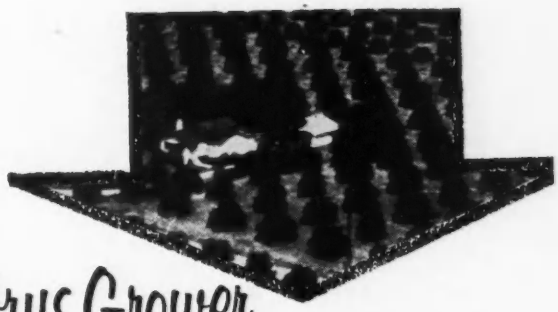
Our program in ornamentals research, including cut flowers and turf establishment and management, has expanded rapidly in recent years. Because of the wide variety of ornamental plant materials — each with separate and distinct problems — I will not and cannot say that our program is adequate to the needs of the several industries involved. It is more nearly adequate now than ever before, and as the problems develop and come to our attention, we will certainly request added help from the Legislature when and if we cannot handle them with present staff. I would expect to see these industries expand greatly in the future.

Animals and Poultry

This being the Horticultural Society, I will just mention briefly our research obligations in the animal and poultry sciences. As you may know, since the close of World War II the several animal industries have progressed by leaps and bounds, particularly the beef cattle development. We have had to expand our program in the areas of nutrition and disease control, and the latter, especially is a difficult field. There are several overlap areas between the animal and plant sciences such as pasture-vegetable rotations and pesticide residues which relate to our horticultural program.

Forage Crops

Finally, we have the field crops and forages, which we consider generally to be agronomic crops. These require almost as much research consideration as do horticultural crops, since they back up the animal sciences. Our program here leans heavily toward the breeding of new and resistant varieties, since the gross per acre value is often too low to justify much expenditure for pesticide control applications. In addition, with our forage crop research, we know that chemical residues may become milk or meat residues, and residue problems are generally complex enough now without getting further involved with these products if it can be avoided. There are times



Mr. Citrus Grower

LET OUR GUARANTEE and SERVICE BE

YOUR

INVESTMENT INSURANCE ...

You cannot afford to gamble when purchasing nursery stock. The GLEN name since 1882 has meant dependability and service—words which mean dollars to you.

Glen nursery stock is guaranteed to live and thrive when planted and cared for properly —but this is not left to chance. We are at your service, even after the trees are yours, and are only satisfied when you have a 100% stand.

Due to very favorable weather conditions, GLEN has one of the finest crops of citrus trees we have ever grown. These sturdy buds are available for late fall and winter delivery, and orders are being taken now.

CONTACT US IMMEDIATELY

before our supply is exhausted, if you are planting any of the following list of citrus trees.

ORANGES ON ROUGH LEMON: HAMLIN - PINEAPPLE - VALENCIA - LU GIM GONG
ORANGES ON SWEET SEEDLING: PINEAPPLE - VALENCIA
ORANGES ON CLEOPATRA: HAMLIN - PINEAPPLE - TEMPLE - ORLANDO TANGELO
GRAPEFRUIT ON ROUGH LEMON: DUNCAN - McCARTY - GLENRED.

Our consultation service is free of charge. In Orlando, it's R. W. (Bob) Parker—GA 3-6839. Give him a call.

GLEN SAINT MARY NURSERIES COMPANY

Executive Offices: WINTER HAVEN, FLORIDA

"DEPENDABLE SINCE 1882"

when the application of pesticides to field or forage crops is vital, however, and we do have some continuing research in this area.

Perhaps the above gives a quick picture of our present program responsibilities and of some horticultural possibilities. I know of no present crop or livestock industry of any real importance that will not expand here in Florida in future years. We have the land area, the water resources, the climate and the manpower expectation for such expansion. The public research agencies must meet and answer the problems involved in such expansion. There will be many such problems, since the land not presently in use is largely marginal land, and we must learn how to use it with profit.

Imagination and Vision

One thing which I hope to retain in every research staff member of the Station is the imagination and vision with which every new, young staff member is endowed when he arrives. Since I came to Florida in 1937 I have seen about every new vegetable crop researcher take a crack at growing cantaloupes. We've tested varieties, conducted breeding work, run fertilizer tests, disease and insect control tests and still do not have a cantaloupe industry of consequence. Yet if you were to ask me if I believe that we will some day have an important industry with cantaloupes, I would still answer yes. And when that day comes, the combined research and testing over the years will have paid off. There are probably several in this audience who have tried growing cantaloupes commercially and have had crop failures. There are also few who have made a little money with them. We are not far from a stable industry. We need new horticultural industries.

So I am going to continue to encourage and approve research project proposals which show vision and imagination, even though our present knowledge status may seem to indicate that the odds are against any long-range economic benefits. Not to the exclusion of work on urgent problems, but because I believe that the big advances come from some of these long shots. I like to see each research man stimulate himself and his co-workers with at least one such project. If a man is incapable of such vision, he may not be qualified for productive research at all. A productive research man must have both training and vision — either one alone is not enough.

I have talked at some length about the research program of the Station, and about its staff. I am proud of both, and hope that you share in that pride. Now I want to talk briefly about facilities.

(Continued Next Issue)

Make a will is the suggestion given Florida farm people by Dr. C. C. Moxley, associate economist with the Agricultural Extension Service.

Dr. Wolfe's Agricultural Laboratories

2620 Taylor Street

HOLLYWOOD, FLA.

Offers Better Yields and Quality Through Periodic Analysis . . and . . Grove Inspection

— — —

Write for Details or Phone

Wabash 2-2808

FROM NEARBY PENSACOLA COMES SUCCESS-PROVEN...

AMMO-NITE

AMMONIUM NITRATE FERTILIZER • 33.5% NITROGEN

SAVE MONEY—BOOST PROFITS! Use AMMO-NITE—with more Nitrogen in the bag—for *less!* See chart below for savings.

Based on a use of 250 lbs. of actual Nitrogen per acre per year in a typical Florida grove, here's a cost analysis of AMMO-NITE (33.5%) and 16% Nitrogens.

	For 250 lbs. actual N you need	Cost	YOU SAVE per Acre Yearly
16% Nitrogen	1562 lbs.	$46.86 (@ $60 ton)*	
AMMO-NITE 33.5% Nitrogen	746 lbs.	$32.82 (@ $88 ton)*	$14.04

**Prices used are for illustration only and are not intended as quotations.*

YOU SAVE ALMOST 30% PER ACRE

That's simply because each AMMO-NITE bag has over *twice* as much Nitrogen! Also, with AMMO-NITE you'll cut bulk, weight, job time and work. AMMO-NITE prills will not clog or stick, flow freely from the spreader.

Buy AMMO-NITE from your favorite dealer.

Manufactured by
ESCAMBIA CHEMICAL CORPORATION
Pensacola, Florida

Exclusive Distributors
ASHCRAFT-WILKINSON COMPANY
Atlanta, Georgia

Hoe 4 trees a minute...

with New POUNDS Grove-Hoe

Case 300 Tractor with Pounds Grove-Hoe

The new revolutionary Pounds Grove-Hoe tills and fertilizes 4 trees a minute. Owners report

The tilling rotor works the ground thoroughly for good aeration and moisture intake. Rotor can be set to till as shallow as ½ inch near the root crowns . . . as deep as 4 inches away from the tree. Tractor creeper gear permits excellent work even in Bermuda. Constant PTO allows stationary working of humps of grass, leaving land practically level.

Fertilizer applied ahead of the rotor is thoroughly worked into the soil. Rate of application is ½ to 6 pounds per tree. Automatic control shuts off fertilizer when you raise the hoe for transport. Get full information from the manufacturer or any of the J. I. Case dealers listed below.

Gentlemen:

"I can hoe 1000 to 1200 trees per 10-hour day. Hoed 50,000 trees from September through December '56.

"Busting crust is a big feature—aerates soil, leads moisture to roots. Doesn't cut crownroots —shallow at base of tree, 2 ½ to 4 inches at the tree's water shed.

"I followed a rotary cutter in tall Johnson Grass. Hoe thoroughly chewed up stubble and roots.

"You can just hoe around the tree, leave weeds or cover crop between tree rows to control wind erosion."

R. J. Patrick

Manufactured and Sold by:
POUNDS MOTOR CO.
Winter Garden, Florida
Sold by:
POUNDS TRACTOR CO.
Winter Haven, Florida
POUNDS INDUSTRIAL GAS CO., *Winter Garden*
POUNDS AGRICULTURAL GAS CO., *Winter Haven*
LP-Gas for Tractors & Industrial Uses

Sold by the following Florida Case dealers:
Moss Tractor Company — Dade City
Thompson Tractor & Equipment Company — Tampa
East Coast Tractor Company — Cocoa
Taylor & Munnell Mach. Works, Inc. — Fort Pierce
Riley Pump & Supply Inc. — Wauchula
Zeiss Motor Company, Inc. — Sebring
or your nearest Case dealer

AND FOR REAL TRACTOR OPERATING ECONOMY

SWITCH TO WARRENGAS

A GREAT FUEL FOR TRACTORS...115+ OCTANE...BURNS CLEAN!

✓CUT ENGINE MAINTENANCE COSTS ✓GET MORE POWER
✓ SAVE ON OIL ✓ SAVE ON FUEL COSTS

This remarkable tractor fuel is available from all Warrengas Distributors everywhere

WARRENGAS

Call Now For A Free Demonstration---No Obligation, Of Course!

The Experimental Studies On Citrus Nematodes (*)

(Continued from page 11)

While the rod is being plunged into the soil, it is rotated slowly.

The compound is applied to the soil uniformly by means of a series of evenly placed plunges into the soil, with equal time being allowed for each plunge. These plunges are continued until the tank is emptied. The amount of fluid pumped into a certain area of soil is calculated according to our experimental findings. It was estimated that an area of five feet in diameter would require about 5 gallons of 1.5% hydrogenated fish oil solution for each application, up to 13 feet deep in the soil.

The Cost of Spraying

The cost of hydrogenated fish oils, estimated on the basis of large scale production is about 30 cents per pound. Thus the material for two sprayings of an area five feet in diameter, or one young orange tree, costs about 12.5 cents. If in addition, two sprayings with piperazine citrate hydride are applied, the cost might reach about 25-28 cents per one young orange tree without counting labor. Such a treatment will not destroy all nematodes but might reduce their numbers to about 1-2% of previously existing worms in this area.

The Field Tests

The present report covers our experimental data only and we are not in a position as yet to make any statement about the practical potentialities, if any, of this method if applied to large scale field testing. Our field tests are still in an incipient stage due chiefly to the absence of a pilot plant for production of hydrogenated fish oils in large quantities which are necessary for such tests. We hope to be able to solve this production problem and to complete this part of our project in the near future.

Summary

A water-soluble, hydrogenated fish oil compound possessing antifungal activity was tested on citrus nematodes by a pilot plant test method.

1 and 1.5% of this compound reduced the number of living nematodes, as compared with control, to about 8-10% when the surface of the soil was sprayed twice with it.

A combined application of hydrogenated fish oil compound and piperazine citrate hydride reduced the number of living nematodes, as compared with control to about 3.5% and 0.75% respectively with six inches and forty-two inches deep soil on a pilot testing scale.

The water-soluble hydrogenated fish oil compound shows no toxicity when applied in their concentrations of 1 or 1.5% to citrus seedlings.

The mechanism of nematicidic action of hydrogenated fish oil compound was not determined as yet but there is a cytologic evidence that this compound interferes with the oxidation processes of the worm.

A pumping sprayer was constructed for application of the compound 8-12 feet below the soil surface.

References

1. Tomiyasu and Toyomizu, Studies on the Antibiotic Action of Fish Components. Bull. Japan. Soc. Sci. Fisheries 18, 155-8, 1952.

2. Tomiyasu and Toyomizu, Studies on the Antibiotic Action of Fish Components. Bull. Japan. Soc. Sci. Fisheries, 18, 263-8, 1952.

3. Tomiyasu and Toyomizu, Studies on the Antibiotic Action of Fish Components. Bull. Japan. Soc. Sci. Fisheries, 18, 683-6, 1953.

4. Tomiyasu, Toyomizu and Takahashi, Existence of An Antibiotic Substance in "Katsuo- and Uni-Shiokara." Sci. Bull. Faculty Agr. Kyushu Univ. 15, 47-52, 1955.

5. Toyomizu, Studies on the Antibiotic Action of Fish Components. Bull. Japan. Soc. Sci. Fisheries, 21, 258-61, 1955.

6. Tomiyasu, Yukio, and Toyomizu, Masamichi. On the Antibiotic Action of the Autoxidised Calamary Oil. Bull. Jap. Soc. Sci. Fisheries, 21-253, 1955.

7. Sokoloff, Boris, and Chamelin, Isidor. "Fish Oil Components for Fungicidal, Insecticidal, and Nematicidal Uses in the Citrus Industry." National Fisheries Institutes Convention, April 17, 1956, Miami Beach; Chem. & Engr. News, p. 5710, Nov. 19, 1956.

8. Kofoid and White, quoted from No. 11.

9. Chitwood, quoted from No. 11.

10. Smith, A. L. and Taylor, A. I.: Field Methods of Testing for Root-Knot Infestations. Phytopath. 37:85, 1947.

11. Tarjan, A. C. and Cheo, P. S.; Nematocidal Value of Some Fatty Acids, Bull. 332, Agricultural Experiment Station, Univ. Rhode Island, April, 1956.

12. Hoerenga, M. T.: Treatment of Multiple Intestinal Worm Infections with Piperazine Citrate. Am. J. Trop. Med., Hyg., 4:1088, 1955.

13. Brown, H. W., and Chan, K. F.: Treatment of **Enterobius vermicularis** Infections with Piperazine. Am. J. Trop. Med., Hyg., 4:321, 1955.

14. Waks, J.: New Applications of Piperazine. Intestinal enterobiasis. Pren. Med. Argent., 42:674, 1955.

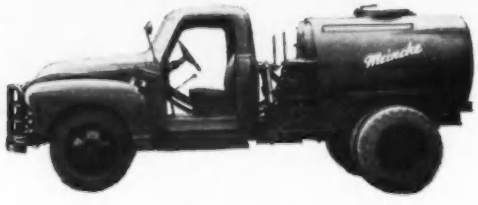
15. Ricci, M. and Corbo, S.: The Effect of Piperazine Hydrate on **Enterobius vermicularis.** Riv. Parassit., 18:73, 1955.

Demonstrates Tropical Fruits To Home Clubs

Mrs. Mary H. Bennett, St. Lucie County home demonstration agent, has demonstrated tropical fruits before home demonstration clubs in the county recently. Members who wished them were given Agricultural Extension Service circulars on avocado, berries, coconut, guavas, mango, papaya and pinaapple.

Water plants add to the decor of garden pools, says Dr. E. W. McElwee, ornamental horticulturist with the Agricultural Extension Service.

Now -- NEW HYDRAULICALLY DRIVEN SUPPLY UNIT



- High speed fill and discharge
- One valve operation
- Constant, active agitation
- Lowest maintenance costs
- Machine is seldom in the shop for repairs
- Heavy duty P.T.O. and hydraulic oil pump
- Three-inch carter pump
- 500 gal. steel tank

Phone For FREE Demonstration or Contact

MEINCKE
SPREADER WORKS, INC.
MANUFACTURERS

ALSO
"SPREDMASTER"
BULK FERTILIZER
SPREADERS
TRUCK AND
TRACTOR DRAWN

DEPT. D — ASTATULA, FLA. • PHONE TAV. DIAMOND 3-6725

Heavyweight...on just ounces of Versene Iron Chelate

Adding iron to your grove with Versene® Iron Chelate helps make trees heavyweight producers at harvest time. And the extra pounds of fruit have a higher sugar content, richer color.

Foliage—including leaves yellow from iron deficiency—turns a rich green, tipping you off on the rewards to come. More and longer flushes develop. Blossoming is better. Even trees starved bare of leaves and fruit for want of iron bounce back to full production with amazing speed.

Just a few ounces of Versene Iron Chelate per tree, mixed right with your regular fertilizer, keep your soil's iron supply at its productive best. Use Versene Iron Chelate in concentrated form with water or liquid fertilizers. Get Versene Iron Chelate on *Vermiculite* for direct application or use with dry fertilizers. Your fertilizer formulator will be glad to furnish additional information. THE DOW CHEMICAL COMPANY, Agricultural Chemical Sales Dept., Midland, Michigan.

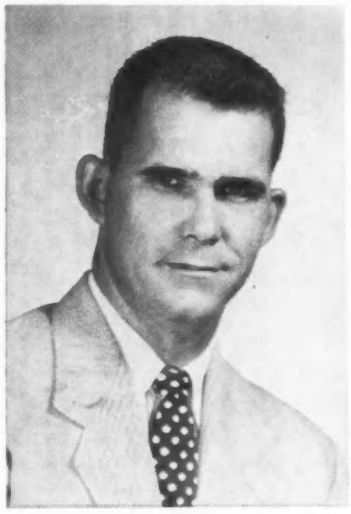
Dow presents The Red Foley Show every Saturday. See radio listing for time and station.

WEED AND BRUSH KILLERS, SOIL FUMIGANTS, GRAIN FUMIGANTS, INSECTICIDES, FEED ADDITIVES, ANHYDROUS AMMONIA, DEFOLIANTS.

YOU CAN DEPEND ON DOW

How To Buy . . . An Irrigation System

PART IV



S. E. DOWLING
ASST. EXTENSION AGRICULTURAL ENGINEER
U. OF F., GAINESVILLE
AT CITRUS GROWERS INSTITUTE CAMP McQUARRIE

(Continued From Last Issue)

The minimum electrical rate did not apply since the electric bill was in excess of the minimum. Any one of the conditions could be changed and therefore possibly change the outcome in favor of one of the other two sources of fuel.

As can be observed from Example II and for the condition stated in that example, a diesel power unit was the most economical source of power. The changing of any one of the stated conditions to fit those in an actual local area could possibly change the outcome in favor of some other source of power.

The minimum electrical rate in Example II did not apply since the equipment operated a sufficient number of hours to use more electricity than the minimum.

After having found the proper and most economical components of the system it will be possible to find the Annual Cost per acre for the system.

A method for determining this annual cost per acre is offered in Example III.

Assuming 160 acres of citrus with a well in the center of the acreage and that all selection of equipment

TABLE 4
LOSS OF HEAD IN FEET PER 100 FEET OF ALUMINUM TUBING WITH COUPLERS*
Based on Scobey's Formula Ks = 0.40

FLOW											
Gallons per Minute	Cubic Feet per Second	2"OD	3"OD	4"OD	5"OD	6"OD	7"OD	8"OD	10"OD	12"OD
10	0.02	0.32	0.05							
50	0.11	6.70	0.90							
100	0.22	21.6	3.21	0.81	0.28					
120	0.27		4.81	1.20	0.39					
140	0.31		6.01	1.48	0.51					
160	0.35		7.81	1.97	0.67	0.28				
180	0.40		9.40	2.31	0.83	0.35				
200	0.44		11.82	3.01	1.02	0.42				
220	0.49		13.3	3.51	1.20	0.49				
240	0.53		15.7	4.09	1.41	0.58				
260	0.58		18.3	4.89	1.64	0.67				
280	0.62		21.1	5.80	1.94	0.81				
300	0.67		23.9	6.61	2.24	0.92	0.42			
350	0.77			8.50	2.79	1.20	0.58	0.28		
400	0.89			10.21	3.69	1.50	0.72	0.37		
450	1.00			12.5	4.46	1.83	0.85	0.44	0.16	
500	1.11			15.3	5.20	2.19	0.99	0.55	0.18	
550	1.22			18.6	6.09	2.49	1 20	0.62	0.21	
600	1.33			21.8	7.60	3.19	1.48	0.79	0.25	
650	1.45			25.3	8.98	3.65	1.69	0.90	0.28	0.12
700	1.56				10.52	4.13	1.89	1.04	0.35	0.14
750	1.67				11.1	4.59	2.15	1.13	0.39	0.16
800	1.78				12.5	5.29	2.40	1.27	0.42	0.18
850	1.89				13.9	5.80	2.71	1.41	0.46	0.21
900	2.00				15.7	6.59	3.05	1.57	0.52	0.22
950	2.11				17.3	7.25	3.35	1.76	0.58	0.23
1000	2.22				19.1	7.95	3.69	1.89	0.65	0.28
1100	2.45				22.9	9.19	4.59	2.31	0.79	0.35
1200	2.67				26.9	11.52	5.41	2.72	0.95	0.39
1300	2.89					12.6	6.79	3.40	1.11	0.46
1400	3.12					14.7	7.30	3.79	1.25	0.53
1500	3.33					16.7	8.50	4.29	1.41	0.60
1600	3.56					18.8	9.28	4.90	1.60	0.67
1700	3.78					21.0	10.20	5.41	1.81	0.74
1800	4.00					23.06	11.01	6.01	2.01	0.83
1900	4.22						12.4	6.70	2.19	0.90
2000	4.45						13.7	7.30	2.35	0.99
2500									3.91	1.59
3000	6.68									2.23

* Schrunk, John F., Design Handbook, Irrigation Equipment Company, Eugene Oregon

TABLE 5
PERFORMANCE OF IRRIGATION PUMPING UNITS
BRAKE HORSEPOWER HOURS/UNIT OF FUEL (1)

FUEL	Fuel Consumption in BHP Hrs./Gallon		
	Average of Tests	Range	Maximum Possible
Diesel	11.2	15.2 - 6.1	15.2
Gasoline	6.9	9.45- 6.0	11.2
Tractor Fuel	7.2	9.5 - 4.8	11.1
Propane	5.7	7.6 - 3.9	8.7
Natural Gas*	5.4*	5.7 - 5.2*	8.3*
Electric**	0.93**	1.15- 0.55**	1.20**

* BHP - Hours per 100 cubic feet of gas
**BHP - Hours per kw

TABLE 6
Recommended Suction Lifts at Various Elevations above Sea Level (2)

Elevation	Practical Centrifugal Pump Suction Head	Vac. Gage In.
Sea Level	15.0	13.3
500 feet	14.8	13.1
750	14.5	12.8
1000	14.0	12.4
1250	13.8	12.2
1500	13.5	11.9
1750	13.3	11.8
2000	13.0	11.5
3000	12.0	10.6
4000	11.0	9.7
5280	10.0	8.8
6600	9.0	8.0
7920	8.0	7.1
10560	7.0	6.2

(1) "Sprinkler Irrigation" Sprinkler Irrigation Association, 1955
(2) Schrunk, John F., Design Handbook, Irrigation Equipment Company

has been made as follows: eight inch mainline, six inch laterals, a turbine pump and diesel power unit.

It is now possible to examine this cost of $44.61 per acre and decide whether irrigating this grove will pay the $44.61 cost plus some return for the investment. If the average anticipated return per acre of citrus is greater than $44.61 the owner could afford to irrigate. If the returns are less than $44.61 then he could not afford to irrigate in this situation.

The annual cost per acre could range from approximately $10.00 to as high as $200.00. Each individual system must be worked out before it can be accurately determined if irrigation is profitable.

In the example it was possible to lump all equipment together because it all had the same life span according to Table No. 1. If the life of any part of this equipment had varied from the 15 years then it would have been necessary to handle each item as the well was handled.

In the purchasing of an irrigation system for a farm be sure to do all of the following.

(1) Have a responsible firm with a trained Irrigation Engineer design the system.

(2) Insist that the design of this system be based on an annual cost per acre basis.

(3) Be sure the designer furnishes a performance sheet.

(4) Have a guarantee in writing that system will perform as performance sheet so states.

(5) Do not buy the lowest priced system but do purchase the system having the lowest annual cost per acre.

(6) Do not buy system piecemeal but do buy from one reputable source that is in business locally and carries a substantial inventory of parts in stock.

(7) Do not purchase any system unless sketch to scale is furnished showing layout system.

(8) Have the Extension Agricultural Engineer or Soil Conservation Engineer check the system design before buying, if possible.

USDA TO PURCHASE CITRUS FOR SCHOOLS

The U. S. Department of Agriculture will again purchase from Florida canned grapefruit sections and concentrated orange juice for the National school lunch program, Homer E. Hooks, general manager of the Florida Citrus Commission said recently.

His announcement came during the Commission's monthly meeting in Lakeland. He said Senator Holland had advised that amounts of the Florida citrus juices to be purchased will be determined by relative prices and availability of supplies.

Last year, the school lunch program meant approximately $2,670,000 to the Florida citrus industry. Some 393,000 cases of canned grapefruit sections were purchased by the government at a price of about $1,700,000. They also bought 497,585 gallons of orange concentrate for $970,000.

Bids for purchase of canned grapefruit sections will be announced by the government on Nov. 22, returnable Dec. 3. Acceptance will be made on Dec. 6, with delivery of the juices scheduled between Dec. 30 and March 1.

Canned concentrated orange juice bids will go out Dec. 6, for return not later than Dec. 17. Acceptance will be made Dec. 20, for delivery between Jan. 6 and Feb. 22.

ONE MORE REASON why the John BEAN Speed Sprayer line is *Tops in Citrusland*

SPEED SPRAYER 40F
40" Axial Flow Fan
500 Gallon Tank

...a model to fit every grower's needs exactly

Speed Sprayer 36F
36" Axial Flow Fan
500 Gallon Tank

When citrus growers think of sprayers they think of the Speed Sprayer — offering a sprayer to fit your grove size. These sprayers have long been famous for increasing yields at less cost. They're preferred for best in performance, ease of operation, and thorough spraying coverage. The next time you think of sprayers, think of Speed Sprayers . . . and make sure you have the Speed Sprayer's air control that assures greater rate of work, metallized tank that is the most corrosion resistant ever developed, and new unitized controls for one-man operation. Inquire too, about the Speed Sprayer's citrus volute and oscillator developed in Florida for Florida growers.

Speed Sprayer 31E
31" Axial Flow Fan, 400 Gallon Tank

Send for Handy Calculator for figuring concentrate or dilute spray solutions. Free!

SPEED SPRAYER FACTORY, ORLANDO, FLORIDA

fmc FOOD MACHINERY AND CHEMICAL CORPORATION

John BEAN DIVISION OF FOOD MACHINERY and CHEMICAL CORP.

ORLANDO, FLA., • LANSING 4, MICH., • SAN JOSE, CALIF.

Problems Related To Production And Distribution Of Cartoned Orange Juice

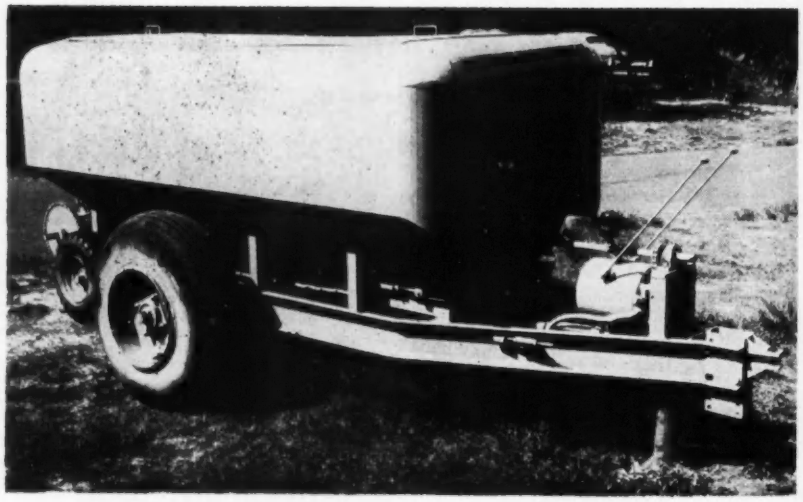
BY DAVID O. HAMRICK

(Continued From Last Issue)

There is no wide difference of opinion within the industry as to what the basic characteristics of good orange juice are. There is very little difference of opinion as to how low the quality of orange juice can drop and still be acceptable. The main difference of opinion within the industry at this time is concerned with the addition of sugar to increase the solids of low solid juice and/or to adjust the brix-acid ratio during certain times of the year. Proponents of the use of sugar say it should be allowed because of three main factors. First, it is allowed in canned orange juice; second, it would allow the utilization of a lot of the Florida oranges that are too low in natural solids to make an acceptable juice without additional solids; and third, they say some consumers prefer a sweetened juice to a natural product. Opponents of the unrestricted use of sugar give these principal reasons. First, if sugar were allowed it would be virtually impossible to prevent economic adulteration; second, they feel that chilled orange juice should be a premium product and no procedure should be allowed which would permit the use of low quality or inferior oranges as the raw material; and third, they feel that the use of sugar would hinder the public acceptance of chilled orange juice as a pure, whole, orange juice. This is the same controversy which raged when the standards were being established for frozen concentrated orange juice. There is also some difference of opinion regarding the use of frozen concentrated orange juice in the manufacture of chilled orange juice. There are those processors who feel chilled orange juice should be made only from whole orange juice, and the product made from a combination of frozen concentrated orange juice and water should be sold as reconstituted orange juice. All of these factors, plus several more small details, will have to be taken into consideration in the final analysis and in establishing a set of standards which will protect the consuming public and still be fair and equitable to all producers.

Problem of distributor education regarding handling procedures: The chilled juice industry faces a problem in distributor education which is simlar to the problem faced by all producers of frozen of perishable merchandise. Their problem is made even more difficult by the scarcity of storage areas with ideal temperatures. Since the increased popularity of frozen goods there is more and more zero degree cold storage space becoming available but this is of no value to the chilled juice distributor. The ideal storage temperature of chilled orange juice is from 29° to 32° Fahrenheit and most of the commercial or dairy cold storage areas will either be zero or forty degrees Fahrenheit. This problem is one that requires an individual solution of the problem although it may be circumvented by requiring that a distributor who does not have adequate cold storage space draw his daily requirements as needed from an establishment that does have adequate storage. At times it is quite difficult to convince a dairyman that this 45° Fahrenheit storage, which he considers to be adequate for milk, is not adequate to store orange juice for a period of a week to ten days. In addition to the actual storage problems in the plant a lot of difficulty has been experienced in impressing the route man with the fact that orange juice is a highly perishable item and it should be accorded the best possible refrigeration and care. At least one company has an educational program directed toward the routemen stressing the following factors:

1. Orange juice must be maintained at 32°F. in order to have a satisfactory shelf life



BAUGHMAN SPREADER

TRACTOR PULL-TYPE (HYDRAULIC)

1. Capacity 3 Tons.
2. Twin Conveyor Chains with Separate Gates.
3. Twin Ground Wheel Metering.
4. Large Distributor — With Two Speeds.
5. Hydraulic Control When Spreading to Either Side.
6. Adjustable Tractor Hitch.

Also Truck-Mounted Units 4 to 10 Tons

CALL US FOR DEMONSTRATION

Baughman Manufacturing Co., Inc.

2222 Auburndale Road — Phone MUtual 7-9063

LAKELAND, FLORIDA

and retain its flavor.

2. If possible only the amount of juice requested by order should be carried on the route.
3. No stock should be left on the truck or platform any longer than absolutely necessary after the route is completed.
4. Stock should be rotated so that any juice returned from a route one day will be the first delivered on the second day.
5. Insure that all of the juice from one delivery be used before starting on the juice of a later shipment.
6. Never overstock retail stores of milk cabinets thus leaving the juice exposed to milk cabinet temperatures for over two days.

This educational program is accomplished by lectures, movies, and display material stressing each point. There is a great need for each producer of chilled juice to attempt a similar program with each of his individual distributors. Not only will this program help to prolong the shelf life of his own product but it will help to insure a more advantageous public relations position for the industry as a whole.

Problem of Consumer Education

In addition to the education of the distributor in handling procedures there remains the problem of educating the consumer what to expect from chilled orange juice. Unfortunately chilled orange juice is in direct competition with canned orange juice and with frozen concentrated orange juice. The housewife knows that canned orange juice is stable for indefinite periods and that no particular precautions are necessary in its storage. Most housewives realize that frozen concentrate must remain remain frozen until its use, and that in its frozen state it is stable for long periods of time. Some housewives are prone to follow the reasoning that if the other two forms of orange juice are stable for long periods of time in their proper packaged condition, then chilled juice should be also. This one assumption has lead to a substantial number of the consumer complaints about this product. The consuming public must be made aware that chilled orange juice is the closest thing to freshly extracted orange juice available, and as such is a highly perishable product that must be consumed within the shortest possible period of time in order to enjoy its best flavor. Another

WORLD'S SAFEST POWER SAW

leaves a smooth, mill-edge cut
PRUNES, LIMBS without damaging bark
• FOR ORCHARDS • GROVES • NURSERIES

the all-new WRIGHT® REBEL

There's only one power saw that can handle every tree trimming, pruning or cutting operation . . . the amazing right Rebel, with the exclusive guarded reciprocating blade; prunes and limbs without damaging surrounding bark, leaves a smooth mill-edge that heals itself . . . cuts mold and rot invasion. Drops trees up to 20" with a single cut.

NO WHIPPIN', KICKIN' CHAIN
...just guide it and relax!

ONLY $189.50
Includes 20" blade

✔ dealerships available
SEE DEALER LISTED BELOW FOR FREE DEMONSTRATION
Distributed By
FRANK ZORC AND SONS
ROSELAND, FLORIDA

EDGEWATER
Edgewater Motors
FT. MYERS
Construction Equipment Co.
FT. PIERCE
Glade & Grove Supply Co.
HAINES CITY
Schneider & Jackson Hardware.
JACKSONVILLE
Holley-Edwards Sales Inc.
LAKE ALFRED
Boozers Service & Supply
LEESBURG
Hood Tractor Co.
MIAMI
Central Machinery & Supply Co.
MIMS
Taylor Bros. Tractor Co.
NAPLES
Naples Service & Supply
OLDSMAR
Pronto Mowers
ORLANDO
Hood Tractor Co.
PANAMA CITY
Bay Machinery & Welding Co.
PENSACOLA
Pensacola Tractor & Equipment Co.
PUNTA GORDA
Punta Gorda Builders Supply
SARASOTA
Construction Equipment Inc.
ST. PETERSBURG
Gulf Coast Industrial Supply Co.
TAMPA
Power Tool Supply
Waynes Auto Parts
WAUCHULA
Riley Pump & Supply Inc.
WEST PALM BEACH
Pollock Sales & Service

source of consumer complaints about chilled juice is the fact that it will vary in taste, body, and color from one time of the year to another. This condition is inherent in the production and distribution of a product which depends on a seasonal raw material. With other citrus products that have been canned or frozen, the entire years pack is put up within a period of a few months using fruit from the several varieties at an almost uniform degree of maturity. In the production of frozen concentrated orange juice the extremely low, or extremely high brix-acid ratio concentrate is placed into barrels and stored for use in a blending procedure when juice of that particular type is needed to standardize the brix-acid ratio of the finished product. It is also a common practice to barrel Valencia concentrate to add back to the early season concentrate the following season, and to barrel cheap early season concentrate to add back to the more expensive Valencia. This assures a rather uniform product throughout the packing season and thus a fairly uniform product available to the consumer throughout the year. This is by no means a criticism of the practice of standardizing the finished product with stored juice, in fact this is a commonly accepted practice or technic. It would be ideal if such a procedure were available to the producer of chilled juice; however, the storage of sufficient chilled juice for a blending operation presents enormous technical and mechanical problems. The producer is faced with two alternatives, either educate the consumer to expect the same seasonal changes they find in the fresh fruit market or prepare to make the huge financial investment needed in storage facilities and blending stock. At least one plant has carried out a modified blending operation using stored single strength Valencia juice to improve the color, flavor, and body of early season juice. This procedure is quite expensive and unless a more ideal technology is worked out for the storage and handling it may prove to be economically impractical.

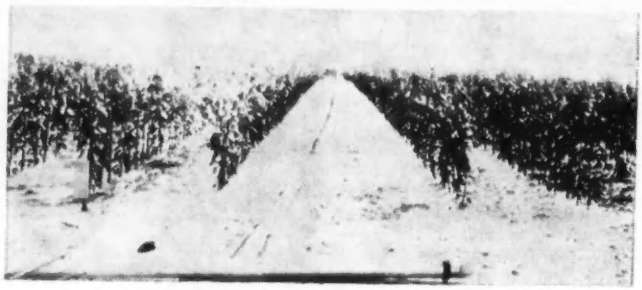
Problem of Adequate Fiberboard Containers:

The problem of container development is one which necessarily must be financed and investigated by container manufacturing companies. The problem, and particularly the solution to the problem, is of vital interest to the producers of chilled orange juice who must market their product in the containers which the container manufacturer makes available to them. The best quality product in the world is of little value if the packaging of that product is so poor as to discourage consumer acceptance or to impair the retail eye appeal. Although the actual physical stamina of the container is a factor over which the chilled juice producer has no control, several firms have experienced drastic economic losses due to carton failure.

The fiberboard carton in use today is essentially the same carton used for milk by the dairy industry. There are some changes made in the type and amount of paraffin used and possibly a few other minor changes. The early cartons were calculated to have a satisfactory storage life of two weeks. A few alterations to production machinery have increased that calculated storage life to three weeks for the cartons now available to the industry. These cartons are made by two container manufacturing concerns with by far the largest volume being produced by the American Can Company plant in Tampa. The carton is made from a fiberboard stock which is 17/000, or 19/1000, inch thick. This stock is formed so that there is only one vertical side seam and the top and bottom are secured in place by a combination of glue and crimping. The whole carton is then dipped into hot paraffin designed to give a moisture resistant coating.

Before becoming too involved in the possible solutions to the problem it would be well to consider the basic structure of the board from which the carton is formed and its inherent disadvantages in prolonged fluid storage. The basic constituent of the board is the cellulose fiber. The strength and rigidity of any paper is a function of the method in which the fibers are meshed or woven in the bonding agent. To be satisfactory for use in the juice carton the fiberboard should meet rigid specifications as to moisture content, size and length of fiber, and method of bonding. The actual moisture content of the paper is a most important item. The cellulose fiber will act as a wick when exposed to moisture and will readily absorb moisture from the atmosphere or from any available source. When the fiber becomes saturated with moisture it loses its strength and stiffness which it must have in order to properly support the load for which it was intended. When the paper of a desired moisture content is formed into a carton the entire carton is dipped into the hot paraffin bath. The purpose of the hit dip into paraffin is to let the paper absorb enough paraffin to form a protective coating around each of the individual fibers thus making a moisture barrier for that

(Continued on page 32)



SELECT NURSERY STOCK

State Inspected
13,000 Choice Nursery Trees — Valencias - Pineapples and Hamlins on Rough Lemon Root Stock
Duncan Grapefruit - Murcott - Pineapple Orange On Cleo Root
— See Them and You Will Buy —
Better Get Yours While They Last

HERMAN E. CALDWELL

P. O. Box 203 **Dundee, Florida**

Southeastern Chemurgic Conference Members Hear Of Florida's Fruit

Addressing members of the Southeastern Chemurgic Conference at a dinner meeting at the Lakeland Yacht Club on the evening of Nov. 14th, Wheeler McMillen, New York, publisher of the Farm Journal and ranking high in the agricultural fraternity of the nation, stated that Florida must concentrate upon the production of higher quality fruit and must look far ahead to the future in anticipating methods of increasing sales, as well as giving consideration to a much more diversified group of crops than is now being done.

Florida's climate and soil, McMillen said, were ideal for the production not only of citrus but of virtually every other crop that can be raised anywhere, but he added that there was need for far greater research than had yet been evidenced in this state to enable us to reach the maximum of profitable production.

He commended Florida Citrus Mutual in their efforts to look into the future with the idea of evolving methods to care for future surpluses. Only two methods appeared practical to the speaker, either to hold production down to where surpluses would be held to a minimum, or in increasing sales to a point where the great portion of crops produced would find ready markets.

For the past 30 years the speaker said billions upon billions of dollars of taxpayers money has been expended to buy up crop surpluses and the situation today is no better than it was when this practice first came into being.

We have been producing along the pathway of theory rather than giving consideration to the facts, said McMillen. Our forefathers, he asserted, operated upon the premise of the facts which faced them. We, too, need to give definite consideration to the facts of Nature. One of these facts, he stated, was the ability of Florida to produce a much more diversified group of crops. Agriculturists in this state, he said, could not start too soon on such diversification efforts, for in spite of the great increase in the volume of citrus produced in this state he quoted Dr. McDowell, research director of the Florida Citrus Commission as stating that the per capita consumption of citrus fruit had decreased by 10 percent in the past ten years. This fact alone, the speaker stated shows the need for study of diversification and in placing reliance upon the facts of Nature, the facts of marketing and the facts of producing practices.

On the 52 major crops produced from the soil McMillen stated a relatively small number of them were considered basic food crops, but he added the possibilities for the production of new products, from sources developed since the last war are virtually limited only by the effectiveness of research.

Rubber, fiber for a multitude of manufactured products, tanning agents, vegetable oils, proteins, cellulose, paper and a vast number of other crops offer Florida, in particular, a rich and productive future when diversification really takes hold.

McMillen stressed over and over again the tremendous value of research in every type of endeavor and said there was every likelihood that the next Congress would triple the already substantial amount being expended upon varied research projects.

He added that effective efforts must be made to forestall patent surpluses so that agriculturists could be more dependent upon their own ef-

(Continued on page 34)

The NEW 1957 . . .

Spred-O-Matic

Stainless Steel Feed Mechanism
Postive Metering of Poundage
A Simple ONE MAN Unit
Standard Parts — —No Gadgets

* * * * * *

Manufactured In Florida For Florida Conditions By:

SAM KILLEBREW, INC.

Havendale Road — Phone Woodlawn 7-1871
AUBURNDALE, FLORIDA

New Developments In Maintaining Quality Crops

J. M. LUTZ
BIOLOGICAL SCIENCE BRANCH
AGRICULTURAL MARKETING SERVICE,
USDA, BELTSVILLE MD.

AT CITRUS GROWERS INSTITUTE
CAMP McQUARRIE

Mr. Winston, Dr. Harding and their staff at previous meetings, have kept you fairly well informed of our research program in Florida. Dr. Long is going to discuss one phase of our work with you at this meeting. I hope that you will continue to invite us to discuss our research results with you in the future. Today I want to devote most of my discussion to research work that is being conducted outside of Florida but may have a bearing on the handling of Florida fruits and vegetables.

We have been hearing about what the future holds for us in the preservation of agricultural crops by new methods. I would like to give you our appraisal of these methods, including the potentialities and limitations as we know them today.

Atomic Radiation

Will it be possible to treat fresh fruits and vegetables with atomic radiation and preserve them indefinitely, or at least during the normal marketing period, without refrigeration? We have been conducting some studies through the cooperation of the Argonne National Laboratory and under contract with the Army Quartermaster Food and Container Institute on the control of certain postharvest diseases of fruits and vegetables. We used the irradiation of spent fuel elements from the Materials Testing Reactor at Arco, Idaho. To completely sterilize a product requires a certain amount of energy, either heat or atomic energy. In the case of atomic energy it takes in the neighborhood of 2,000,000 rep. At this dosage the organisms affecting fruits and vegetables are killed, but the fruit or vegetable is also killed, and is no longer a fresh product. Combining irradiation with refrigeration seems to hold the most promise for fresh fruits and vegetables. The amount of irradiation received by the experimental fruits and vegetables depends on two factors: exposure time and proximity of the fruit or vegetable to the source of gamma rays.

We have experimented with various fruits and vegetables, including strawberries, grapes, navel oranges, lemons, peaches, potatoes, and onions. We were concerned with stopping or delaying the development of such common diseases as gray mold of strawberries and grapes, rhizopus rot of strawberries, brown rot of peaches, blue mold of apples and citrus fruits, and other fruit and vegetable disease.

Almost without exception, dosages of irradation required to completely destroy the organism also have deleterious effects on the fruit or vegetable itself. For each product an attempt was made to reach a compromise between a minimum dosage required to completely kill the decay-causing organism and the maximum dosage that would have no detrimental effect on the quality of the product. Tests on Jonathan apples showed that proper dosages of gamma radiation can reduce the development of blue mold in stored apples without affecting internal core breakdown, color change in the skin tissue, or texture of the apples. For fresh strawberries we have found that irradiation more than doubles their storage life without visible adverse effects.

While experiments showed that it was possible to greatly reduce or retard the growth of blue mold of California-grown oranges or lemons, radiation may alter them in a manner not yet understood. Alternaria, a weak pathogen that harbors itself within the button, has been troublesome in irridiated lemons and oranges.

Irradiation is a potent potato sprout inhibitor. Complete sprout inhibition is obtained in dosages of around 10,000 rep. However, internal black spot is more serious in irradiated potatoes. In addition, irradiation apparently retards the healing of injured surfaces and, as a result, irradiated potatoes are more susceptible to decay. To inhibit most decays, dosages of 100,000 to 300,000 rep. are generally necessary but potato organisms have a wider range in susceptibility. The potato late blight organism is inhibited by dosages as low as 25,000 rep. while other potato rot-producing organisms survives dosages as high as 500,000 rep.

Commercial application of irradiation for extending the market life of fresh fruits and vegetables does not appear probably any time soon. A pilot plant for irradiating agricultural products is scheduled to go into operation in Stockton, Calif., in 1958. We are going to continue our research on fruit and vegetable irradiation so that if and when the equipment and facilities become available, we will be able to use them most effectively. For the next several years at least, we are going to have to depend on conventional methods, such as careful handling, refrigeration, accepted fungicides and other means to prevent spoilage during marketing of our fruits and vetetables.

The National Research Council of the National Academy of Sciences reports that "experiments to date indicate that irradiated foods do not became radioactive and they will be suitable for consumption by man."

Antibiotics

Antibiotics, such as streptomycin sulfate and terramycin, are used to some extent commercially to control or reduce the severity of certain field diseases, particularly fire blight of pears and apples. They are also used to a limited extent in seed beds to reduce wild fire and blue mold of tobacco and for content of bacterial spot of tomatoes and peppers. Streptomycin has been effective in experimental trials in some instances in reducing bacterial blight in Persian walnuts and seed piece decay in potatoes.

There have been some studies made on the use of antibiotics as a postharvest dip of fresh fruit and vegetables. Streptomycin sulfate at 1,000 p.p.m. or terramycin at 25 to 50 p.p.m. effectively reduced bacterial decay of packaged spinach. It did not eliminate causative bacteria but the shelf life was increased 1 to 2 days by the treatment. Additional studies show that antibiotics are effective in extending the shelf life of cole slaw and salad mixes and give some promise for reducing the shelf life of pre-peeled potatoes. There are indications that a combination of antibiotics inhibits the growth of bacteria, yeast and fungi found in pre-peeled potatoes.

The only commercial antibiotics

which have been approved thus far by the Federal Food and Drug Administration for an agricultural product moving in market channels have been chlorotetracycline (CTC) and oxytetracycline (OTC) on poultry. These antibiotics are now being widely used in this country to extend the shelf life of poultry under refrigeration. These antibiotics have been approved for poultry because they are destroyed during heating; since poultry is always cooked, there seems to be no danger of an antibiotic residue. Antibiotics are probably best suited for use on fruits and vegetables which require cooking, such as potatoes and snap beans. The danger of antibiotic residue is eliminated if a heat-labile antibiotic is used. The application would probable be as a supplement to but not as a substitute for refrigeration.

Poultry studies conducted in cooperation with the University of California revealed that some forms of bacteria developed resistance to the antibiotic in commercial use. Extension of shelf life is still being obtained from the use of antibiotics on poultry, but these studies emphasize that it is not a fool-proof method.

Chemicals

I am sure you are all aware of the value of the Dow-A-hexamine1/ treatment and of biphenyl in extending the market life of citrus fruits. There is another chemical, ammonia, that is presently receiving considerable attention in California. Some 25 years ago, British workers reported that damp crystals of ammonium bicarbonate inhibited decay of oranges caused by green mold. They also found that continuous exposure to 500 to 1,000 p.p.m. of gaseous ammonia prevented decay but that a concentration of 2,000 p.p.m. was injurious to the fruit. Apparently, because of the injury hazard, they made no attempt to apply the method commercially. Recently California workers have re-evaluated the utility of gaseous ammonia in this regard. They injected 2,500 to 5,000 p.p.m. of ammonia, over a period of 3 days, into the free air space inside boxes of lemons and oranges. The treatment proved effective in preventing the development of blue mold with no indications of fruit surface injury, darkening of buttons, or off flavors in the juice.

Several compounds capable of releasing ammonia slowly, were investigated. Among these, ammonium succinate is most promising. We are cooperating with the University of California in testing the commercial effectiveness of ammonia as a fungistat, particularly in rail and truck shipments. In making these tests we are using biphenyl as a standard of comparison.

In general, several types of ammonia treatment have compared very favorably with biphenyl in the control of decay itself. On the other hand, biphenyl is considerably more effective than ammonia in inhibiting sporulation of molds. It was found that with an equal amount of decay in cartons of citrus there will be more mold spores on the ammonia-treated fruit than in that treated with biphenyl. In addition, there seems to be sufficient biphenyl absorbed by the rind of the fruit to give it decay inhibiting properties after it is removed from the biphenyl-treated carton.

Considerably more experimental work has to be done before we can recommend the use of ammonia, rather than biphenyl, for citrus. A high moisture content of the air within the package is required for the release of ammonia from the am-

1/ Dow A is sodium orthophenylphenate. Hexamine is hexa methylene tetramine.

Here's why FFF Brand Fertilizer gives Growers

ASSURANCE OF RESULTS

Florida Favorite Fertilizer is different. It is specially formulated for YOU the grower. There's no hit or miss with FFF Brand. Florida Favorite Fertilizer is made by men who know Florida crops and soils. This means top yields and quality from each acre you plant.

A fleet of 15 trailer truck units giving complete and on the spot field service is standing ready to serve you. This direct Fertilizer service to the field, grove or pasture will save you time and money. Try FFF Brand Fertilizers. You'll Profit Too!

florida favorite fertilizer
INCORPORATED
PH. MUTUAL 2-1291 • P.O. BOX 912 • LAKELAND, FLA.

CITRUS GROVES
FIELD CROPS
PASTURE GRASS
TRUCK FARMS

Write for full information

monia-yielding pellets, so it is necessary at the proper relative humidity be maintained in the package. This in turn may be influenced by the temperature and the rate of cooling, and even by the size of the fruit. We are continuing our tests on this material, but it is still on the experimental stage.

Retail Store Handling

Oranges packaged in open-mesh bags or displayed loose in bulk in retail stores under non-refrigerated conditions lose an average of about 1 percent weight per day. These weight losses at the terminal market occur not only in the retail store itself, but also at the wholesale level and in the home. We have found that during a 7-day holding period at 70° F., weight loss was sufficient to cause shriveling of fruit and a marked loss of firmness. Because of this weight loss and other deleterious effects associated with it, there has been considerable interest in packaging of oranges in polyethylene bags for retail sale. Polyethylene bags maintain high humidity around the fruit, substantially reducing weight losses. However, because of this higher humidity, decay is usually more severe in polyethylene bags. In some of our earlier work we found that 8 to 16 ¼-inch holes were all that was necessary to prevent accumulation of carbon dioxide and to provide adequate ventilation in 5-pound polyethylene bags of oranges. In later studies, we found that decay was substantially less if the bags were perforated with 64 ¼-inch holes. Weight loss was not excessive and shriveling was negligible with this amount of bag ventilation. However, even with this amount of perforation we find about 1/3 more decay in polyethylene than in open-mesh bags. The effect of polyethylene bags in increasing decay can be counteracted by treating the fruit with Dow-A-hexamine. Oranges treated in Florida with Dow-A-hexamine and packed in polyethylene in New York City had about the same amount of total decay as untreated fruit packed in mesh bags. Thus, the fungicide compensated for the adverse effect (from the decay standpoint) of packaging in a moisture-proof film.

Packaging oranges in polyethylene in Florida, even when they are treated with Dow-A-hexamine, often results in a high percentage of decay. This is due at least in part to the high transit temperature, and suggests the need for prompt cooling and good transit refrigeration if fruit is to be handled in this manner. Cooling is difficult in fruit packaged in polyethylene bags, which are in turn packed in master containers, than fruit not packaged or packaged in mesh bags.

For oranges displayed in retail stores in bulk, we have found that sprinkling with tap water reduced moisture loss somewhat and had no harmful effect on the condition of the fruit. Refrigeration is very helpful in extending the shelf life of oranges, but unfortunately there is so much competition for refrigerated space in most retail food stores that few oranges are displayed in refrigerated cases. We recommend that retail stores keep their oranges overnight in refrigerated rooms as they rarely are refrigerated while on display.

Marketing Agreement-Order For Florida Citrus Amended

Amendment of the marketing agreement and order regulating the handling of oranges, grapefruit, and tangerines grown in Florida was announced by the U. S. Department of Agriculture.

This action follows approval of the amendment by 96 percent of the growers voting, and 96 percent of the volume of fruit represented, in a referendum conducted during the period September 7 through September 14. Handlers of 64 percent of the Florida oranges, grapefruit, tangerines, and tangelos shipped during the 1956-57 marketing season have signed the agreement.

Principal amendments (1) add tangelos as a fruit subject to regulations under the program; (2) extend regulations to cover all exports as well as shipments to intrastate markets beyond the roadguard stations in Florida; (3) authorize separate grade, size, condition, and container regulations for fruit exported to destinations other than Canada and Mexico; (4) permit the establishment of minimum standards of quality and maturity when prices exceed parity; (5) revise the provisions relating to inspection; and (6) clarify the scope of the present exemption covering fruit shipped for conversion into by-products.

The amendments are based upon evidence presented at a public hearing held at Lakeland, Fla., Feb. 25-26, 1957, and become effective Dec. 2, 1957.

EMJEO

(80/82% MAGNESIUM SULPHATE)

For many years a favorite and dependable source of soluble magnesia for Florida crops. Used extensively in fertilizer mixtures for citrus crops and vegetables. Especially useful and economical for direct application where only magnesia is required.

In Florida, magnesium is now classed as a primary plant food together with nitrogen, phosphorus and potash.

The recommendations of the Florida Citrus Experiment Station at Lake Alfred, stress the need for large application of magnesium for Citrus in soluble form and state that it is usually applied as a Sulphate.

Be sure that your fertilizer manufacturer includes **EMJEO** in your mixtures as a dependable source of soluble magnesium.

BERKSHIRE CHEMICALS, INC.

420 Lexington Avenue New York 17, N. Y.

. Magnesium .
. For a Full Harvest .

The Department of Fruit Crops Of The University of Florida; Its Organization And Objectives . . . .

(Continued from page 13)

ing counties, program projection plans for the counties, 4-H Club work and demonstrations of desirable production practices within the counties. Additional emphasis has been placed in two areas of their work which is most necessary to an efficiently operating organization. A much closer liaison has been established between the Citrus Station, Lake Alfred, the U. S. D. A., Horticultural Station at Orlando and the extension personnel. It is especially necessary that extension personnel keep currently informed on the progress and results of new and continuing research work. So that this can be accomplished, conferences are scheduled each month between extension personnel and research men at these Stations. This information is then made available to county extension personnel through "agent's conferences" conducted by the citrus specialists for the county agents and assistant county agents in the citrus counties. These work sessions are exclusively training sessions for county agents and are limited to a small number of individuals, usually personnel from three or four neighboring counties. There is a very large citrus extension responsibility in Florida and it can only be accomplished by a close-working relationship between research and extension personnel.

Research

The research program of the Department of Fruit Crops is presently developing in two ways. First and of primary importance is the coordinated programs developed with the Citrus Station for citrus problems and with the Sub-Tropical Station for other sub-tropical fruits. Under this arrangement, the graduate student will be located, supervised and work on a research problem mutually agreed upon by University and Branch Station personnel. In all cases, Branch Station personnel will serve as members of their committee and will act as chairmen where they assume immediate leadership of the research problem. Under such an agreement, all Experiment Station personnel are members of the graduate faculty and provide us with one of the strongest graduate staffs available anywhere in the United States. Such an arrangement also strengthens the research program for through the use of competent graduate students, it makes possible the development of basic research programs which lack of time and the need for immediately applicable information on a problem may prevent the research worker himself from undertaking. It is very often as a result of leads developing through this type of research that important future technological advances are made. It is through this type of program sincerely supported by both College and Experiment Station groups that we can adequately train and develop competent personnel and at the same time make a substantial contribution in necessary research areas.

In addition to the cooperative research with Branch Stations, the Department of Fruit Crops is developing research in two other areas, which because of geographical locations, facilities and personnel, we are in a good position to undertake. One of these deals with the securing of information which will lead to a better understanding of the problems of frost protection and the possibilities of preconditioning plants to increase their cold tolerances. The latter work will be conducted largely in controlled climate or growth chambers, whereas the frost protection studies will be done under field conditions where the environment at Gainesville during most winters is especially well adapted for this work. This research will involve the testing of a wind machine, the practicality of its use under Florida conditions alone and in combination with heaters and irrigation equipment.

Another area of research will be concerned with the development of suitable varieties of fruits upon which a fruit industry for north and west Florida may be developed. There is a rather large geographical area, some 300 miles in width, extending from the northern limits of the present citrus belt to the southern limits of the present peach belt where no commercial fruit industry of con-

(Continued on page 32)

Superior CITRUS TREES

AVAILABLE NOW—Prime quality trees grown to exacting standards on nematode-free virgin land. Prices start at $1.25.

Hamlin, Pineapple, Valencia, Orlando, Temple
Red Grapefruit, Persian Lime.

SPECIAL—Limited quantities of SPB Certified Psorosis-free trees on rough lemon. Parent stock tested for 5 years by Plant Board. List of available varieties sent on request. Also will bud on order for you for delivery next Fall.

DON'T TAKE CHANCES—Guard your grove's future. Be sure the trees you buy are the best. A nickel saved on a poor tree is no bargain. We invite your inspection of our trees **before** you buy. Our guarantee protects you.

FREE Our consultation service is available without obligation. We shall be glad to inspect your site and make recommendations. Just call Glendale 2-7541 or write

WARD'S NURSERY
BOX 846 AVON PARK, FLA.
Serving the Florida Citrus Industry Since 1924

ADVERTISEMENT — LYONS FERTILIZER COMPANY

The LYONIZER

COMPILED BY THE LYONS FERTILIZER COMPANY

Reports Of Our Field Men . . .

EAST HILLSBOROUGH AND PASCO COUNTIES
E. A. McCartney
914 River Hills Dr.
Temple Terrace, Tampa, Fla.
Phone WE 8-2852

After more rain than we have ever had it has turned off dry except a few spotty showers. Irrigation equipment is working in some groves where it doesn't interfere with picking fruit. Fruit has been moving in good volume as it has matured early but the solids are a little low probably due to the heavy rains in the summer. Dolomitic Limestone is being used by more growers this season than usual.

Vegetables are moving in good volume and at fair prices.

We are in the middle of our fall fertilizing season which will run through December. Some rust mites, red spider, but not as bad as in some sections I have seen. Bad news in this morning Tampa Tribune, orange prices are down to 70c a box on the tree. grapefruit is doing better. What if you don't have grapefruit—so as Alfred Hitchcock says I will leave you with those cheerful words.

HIGHLANDS AND POLK COUNTIES
J. K. Enzor, Jr.,
P. O. Box 1304 Winter Haven, Fla.
Phone Cypress 3-4716
R. E. Lassiter, Jr.,
1168 Lakeshore Blvd.
Lake Wales, Fla.
Phone 3-3813

We are experiencing our usual fall leaf drop on citrus at the time of this writing. Firing has been observed in many places in the last few days. This is being caused by rust mite, purple mite, Texas citrus mites, or a combination of any or all of these insects. We are also getting a leaf drop in some blocks which appears to be more or less normal. In these blocks quite often there are no mites of any kind present. It appears to be old leaves and some greasy spot leaves.

Most growers in this area were very pleased with the reduction of the grapefruit estimate this month. However it has not caused much excitment because most of them realize that this estimate will be reduced further. Many grapefruit blocks are picking even shorter than was estimated earlier.

At the time of this writing most of the groves which were sprayed with Zineb have had to be sprayed with sulfur to control the rust mites which have built up. Most growers, however, were able to save at least one spray by the use of Zineb.

NORTH CENTRAL FLORIDA
V. E. Bourland
Winter Garden, Fla.
Phone 107

We are having dry, and very unusual fall weather. Lots of groves being irrigated, and little trees being watered. Fruit is moving slowly on account of testing. but is coloring up nicely. All kinds of Spiders and mites are prevalent which are keeping the growers busy trying to keep them under control.

Vegetables in this section are growing nicely, some pepper and squash being shipped. Cabbage looking good. Weather too warm for making good lettuce.

Watermelon growers are thinking in terms of acreage to plant, and making all preparations so that all will be in readiness when the time is right for planting.

SOUTH HILLSBOROUGH AND MANATEE COUNTIES
Eaves Allison
P. O. Box 365, Sarasota, Fla.
Phone Fulton 8-2611

Fall tomatoes are moving in some volume from first plantings in the Ruskin-Palmetto area. Acreage planted this fall was relatively light and oldest plantings —which are picking now—Nov. 15th—had a rough time from flooding rains at blooming time. All the plants took a beating but it is showing up worst on the oldest ones.

Citrus is coloring well and some movement is noted—however not yet heavy from this area. Groves are beginning to show signs of needing water in a few instances. Surprisingly, after all the heavy rains which stopped about six weeks ago, there are now signs of drouth showing up. Many ponds and low areas have already dried up and water in the big drainage canals is low. It got away in a hurry.

Late fall citrus applications of that good Lyons fertilizer are now in order.

SOUTH POLK, HIGHLANDS, HADDEE, DeSOTO AND SARASOTA COUNTIES
C. R. Wingfield
Avon Park, Fla.
Phone Glendale 2-81881

The middle of November finds us greatly in need of a good shower of rain. We have wondered where all the moisture of a few weeks ago has gone and feel the continued heavy winds have been a factor. Some leaf damage is being found on the north and north-east side of the tree. Makes us look for the Purple Mite but in most cases they are not found but in their place Rust Mite and the Texas Mite is found in large numbers. Perhaps the damage found is a combination of the leaf sucking insect and winds.

The fall application has been under way but has been drawn out due to weather conditions. With a promised rain on the 19th, and then cool weather a little more activity will be expected. Fruit prices appear to be a little stronger although it is below normal. Some are selling while others are hopeful of better prices. Buyers appear to be a little more active at the present than they have for some time.

Vegetable growers are moving their crops but the price returns are very low. Tomatoes are leading the way with squash, cucumbers, egg plants running way behind. Peppers have been fair along with some beans.

PRODUCE
MAXIMUM
CROPS
Of
HIGHEST
QUALITY
With
LYONS
FERTILIZERS

ADVERTISEMENT — LYONS FERTILIZER COMPANY

Uncle Bill Says:

Sometimes we git sort of fed up over the constant naggin' we hear about the need fer us citrus growers to produce better fruit so that the folks who eat our fruit and drink the citrus juice we put up in different forms will be happier over the quality of the citrus that comes from Florida . . . but the other day we read where the research director for the Florida Citrus Commission said that the per capita consumption of Florida citrus fruit had decreased 10 per cent during the past ten years.

'Course we're raising more fruit here in Florida now than we ever did and we're sellin' it, too, but on account of production fallin' off in some other citrus producin' areas is the only reason we're able to keep increasin' our volume and to sell our fruit like we're doin' . . . so we guess the folks who is bearin' down on the need for producin' better fruit know what they're doin' . . . it's fer sure that if the consumers gits citrus fruit from Florida that looks better and tastes better then they'll eat and drink more of it . . . and that'll help the per capita consumption.

They is more babies bein' born every day, just as they is more citrus trees bein' planted every day and by the time these youngsters gits real interested in the sort of food they git these new trees will come into bearin' with more fruit, so it's up to us to make our oranges and grapefruit look and taste so good the demand will increase to a point where nobody kin have a meal without demandin' some good Florida citrus.

They is also a trend towards diversifyin' our crops, which is always a good idee, but on the other hand they ain't no reason why any of us citrus growers need start to worryin' yet cause they is too much citrus fruit . . . so long as we send good fruit to the market . . . fruit that looks good and tastes good then I don't think we got anything to worry about.

And of course, the best way to raise this kind of fruit is to use Lyons Fertilizer, fer as they say Lyons Fertilizers Produce Maximum Crops of Finest Quality.

151404

Problems Related To Production And Distribution Of Cartoned Orange Juice . . .

(Continued from page 24)

fiber. It is assumed that by this procedure the wicking action of the fiber will be delayed long enough to give the finished carton a life of some three weeks. The actual amount of paraffin absorbed by the paper must be closely controlled for too little paraffin will allow excessive moisture absorption by the fibers. In theory the coating of the individual fibers with pa... sounds good but seldom does the process work as calculated. The wax layer is very thin and is extremely susceptible to thermal shock caused by temperature changes or to traumatic shock caused by mechanical disturbances. Either of the above mentioned shock will cause a fracture in the paraffin layer. Each of these fractures is a potential avenue for the moisture from the juice to reach the fibers of the carton. As soon as moisture reaches these fibers the wicking action of the fibers soon reduce the carton to a soggy, shapeless mass. Even with fractures in the paraffin layer there are certain conditions which tend to make the carton soft before its calculated time. Any fluctuation of storage temperature causing the outside of the carton to sweat will increase the danger of bulged cartons. Freezing of the juice in the carton is sure to cause bulging when the product thaws.

Any solution to the container problem must come from the technical and production experts of the container manufacturer. Some of the possibilities which merit research are indicated below:

1. Using an inert plastic which will give a positive moisture barrier.
2. Use a double thickness paper which has been welded together to increase the wall strength and use metal tops and bottoms.
3. Find a paraffin which is not as susceptible to shock as the one now in use.
4. Find some means of pretreating the fibers to avoid moisture absorption before the fibers are made into board.

There are about 10,000 agricultural marketing and farm supply cooperatives in the United States, according to the Farmer Cooperative Service of the U. S. Department of Agriculture.

The Department of Fruit Crops Of The University of Florida; Its Organization And Objectives . . . .

(Continued from page 29)

sequence exists. This area is characterized by winters too mild to satisfy the chilling requirement of northern varieties of small fruits. Unfortunately, the quality of most fruits with low chilling requirements is too inferior to enable them to compete satisfactorily on a competitive market. Our problem presently is to breed low chilling requirement fruits of high quality. For example, there is a strong market for early peaches of good quality and suitable varieties could form the basis for a rather large new industry in parts of this area. From this work there will undoubtedly also be developed varieties adapted to central and perhaps southern Florida. Such varieties could be used for interplanting young citrus plantings to increase the income during the early life of the grove and at the same time tend to diversify the state's fruit industry. Emphasis is presently being placed on peaches, blueberries, grapes and the brambles in this breeding work.

Through reorganization of the Fruit Crops' work, it has been possible to strengthen and increase the scope and facilities of the teaching program, to incorporate the extension work in the Department, and more closely coordinate it with the research and teaching programs and to develop a close-working relationship at the graduate level between the University and the other research groups in this field. All of these things contribute toward the main objective of developing a Fruit Crops' program at the University of Florida second to none.

The 1960 convention of the National Association of County Agricultural Agents will be held in Miami with headquarters at the McAllister Hotel.

CITRUS INSECT CONTROL FOR DECEMBER, 1957

(Continued from Page 3)

fur per 100 gallons is the most effective sulfur combination for winter control. It should not be applied on Temples, tangerines, and early varieties of oranges because it may cause burn where a drop of spray dries on the under side of the fruit. Dusting sulfur may also be used, but it is not as effective as a spray.

Zineb at 1/2 to 1 pound per 100 gallons is very effective, but a very thorough coverage is necessary. Zineb can be mixed with DN Dry Mix or Systox, but has not been tested with either aramite or ovex.

Scale Control: Where scale control is necessary, use 1.7 pound of 15 percent parathion or its equivalent in other forms, or 5 pounds of 25 percent malathion per 100 gallons. Make the application on a calm day when the temperature is not below 65 degrees. On the east coast a winter application of parathion has been very effective for scale control.

An oil spray is effective, but it makes trees more susceptible to cold injury any time during the winter. A mixture of .7 percent oil plus 1 pound of parathion may cause as much leaf drop as 1.3 percent oil. Oil may also affect the trees in such a way that they will not produce the normal amount of bloom next spring, which, in turn, may result in a light crop or excess late bloom fruit. A winter oil spray will also retard degreening of Valencias.

USDA Announces Plans To Buy Grapefruit Sections and Concentrated Orange Juice

The U. S. Department of Agriculture has announced plans to purchase concentrated orange juice and canned grapefruit sections from 1957-58 crop citrus for use in the National School Lunch Program.

Dates have not been determined, but purchases probably will be made after processing of citrus fruits from the 1957-58 crops becomes general.

Quantities bought will depend on quantities and prices offered and the supplies which can be used in school lunch programs during the current school year. Purchases will be made with Section 2 funds.

Farm-City Week was observed in Pinellas County with all Kiwanis Clubs in the county taking part in a farm tour and chicken barbecue, Nov. 26, according to County Agent John H. Logan.

1956-57 Florida Oranges Produced 570,000,000 Gallons Of Juice

There was enough juice processed from Florida oranges during 1956-57 season to furnish 47 six-ounce servings, or almost one a week, to every man, woman and child in the U. S.

A staggering total of 370,000,000 gallons of juice, give or take a few thousand gallons, was produced from 68,033,862 boxes of oranges used in the various forms of juice products during the year.

Frozen orange concentrate, which is transformed into America's favorite breakfast beverage by the addition of three parts of water, accounted for the largest utilization of oranges. A total of 48,827,354 boxes of oranges went into this form of concentrate, called the "Cinderella of the Florida Citrus Industry."

Other juice uses include oranges for "hot pack," used extensively as a base for orange drinks; canned or "single-strength" and blends. These and "chilled" juice accounted for approximately 19,250,000 boxes.

These figures, plus statistics on almost every phase of citrus production and utilization, are included in Florida Citrus Mutual's "1956-57 Annual Statistical Report."

The 95-page book was compiled by the Statistical and Economics Division of Mutual and has just been released to the industry and the public by Robert W. Rutledge, general manager; Robert C. White, economist; and William B. (Bill) Connor, statistician.

Among significant figures shown in the report:

Of the 93,000,000 boxes of Florida oranges in 1956-57, 54,300,000 boxes were early and mid-season and 38,700,000 boxes Valencias. In the early and mid-season total, 2,700,000 boxes of Temple are included.

Of 37,400,000 boxes of grapefruit, 21,600,000 boxes were seedless and 15,800,000 boxes seeded.

There were 4,800,000 boxes of tangerines.

In addition to the oranges processed, 17,156,056 boxes were [illegible] to interstate shipment as fresh fruit; 1,522,100 boxes moved by express, mainly in the form of "gift boxes;" 1,426,843 boxes of fresh fruit were exported, and 521,507 boxes were sold inside Florida.

A total of 16,813,398 boxes of grapefruit were shipped fresh, while 19,038,037 boxes were processed.

The U. S. Dept. of Agriculture has announced an offer to buy canned grapefruit sections, packed from the 1957-58 crop for school lunch programs.

"Grove-Land Trees"
ARE Better
- - - -
Place your order now for
Hamlins - Parson Browns - Pineapples
Valencias or Murcotts
on
Lemon - Sour - Cleo or Sweet Root
We will grow for you, on contract, any variety, on any root stock.
Our tree quality is higher,
BUT,
Our tree prices are no higher.
Groveland Nurseries, Inc.
R. R. No. 1 Box 772
Phone: Garden 9-3427
GROVELAND, FLORIDA

SOUTHERN DOLOMITE
PALMETTO, FLORIDA
PHONE: BRADENTON 2-1411

SOUTHEASTERN CHEMURGIC CONFERENCE MEMBERS HEAR OF FLORIDA'S FUTURE

(Continued from page 25)

forts and ingenuity. Indeed, he asserted, this objective must be accomplished, since the potential of increased production points to double the present agricultural production in the next 20 years.

Science, research and Nature working together will be able to accomplish wonders, said McMillen, but it was evident the speaker felt that the campaign of artificial price stimulants through government subsidy was not the real answer to agriculture's problems. A program based upon fact was the answer to agriculture's marketing and production program according to the speaker.

Scientists at the Plum Island Animal Disease Laboratory off Orient Point, Long Island, report that they have purified, isolated, and photographed the foot-and-mouth disease virus. It is spherical in shape and is about one-millionth of an inch in diameter, the smallest of any of the viruses affecting animals. This new information about the virus is expected to speed up research toward combatting the disease.

GROVES

We have several fine Grove Properties

For Sale

TOWER REALTY
204 E. Park Ave.
Lake Wales, Fla.
Tel. 3-3552

Classified Ads

SUPERIOR CITRUS TREES available for Fall 1957 and Spring 1958 planting: Valencias, Hamlins, Pineapples, Orlandos and other varieties. Write for quotation and your FREE copy of "Care of Young Citrus Trees." WARD'S NURSERY, Box 846, Avon Park, Florida. Phone GLendale 2-7541.

YOUR GROVE DESERVES THE VERY BEST — Personally selected buds on large lemon root. Grown on high sand land to exacting standards for old time hardiness with today's high production. Jim Crump Citrus Nursery, Phone Cypress 3-2958, 551 Avenue O SE, Winter Haven, Florida.

FOR SALE COMPLETE PACKING HOUSE EQUIPMENT. Excellent condition. Capacity of 800 boxes per day. Washers, graders, many extra brushes, parts, etc. Frank Stirling & Sons, Route 1, Fort Lauderdale, Florida. Phone Ludlow 30831

Completely reconditioned CASE GROVE TRACTOR . . . like new! Fully Guaranteed. $1500. Call or write POUNDS TRACTOR COMPANY, Winter Haven. Phone CYpress 3-3159.

CITRUS TREE SNAILS. Taking orders for dormant January delivery. Lots of 500 or more. Frank Stirling & Sons, Route No. 1, Fort Lauderdale, Florida. Phone 30831.

Used Fertilizer Distributors

We have for sale at considerable discount . . .

Several 1956 Model Demonstrators And Rental Units

These machines are in good to excellent condition and are a real buy at prices offered.

See Them At:

SAM KILLEBREW, INC.
Havendale Road
Auburndale, Florida

KEEP INFORMED

On Matters
Pertaining To Citrus Production
By Reading
THE CITRUS INDUSTRY
Every Month

Tear Out and Mail Coupon Below

The Citrus Industry,
Bartow, Florida

Please send me The Citrus Industry for 1 ( ), 2 ( ), or 3 ( ) years.

Name _____

Address _____

_____

SUBSCRIPTION RATES:

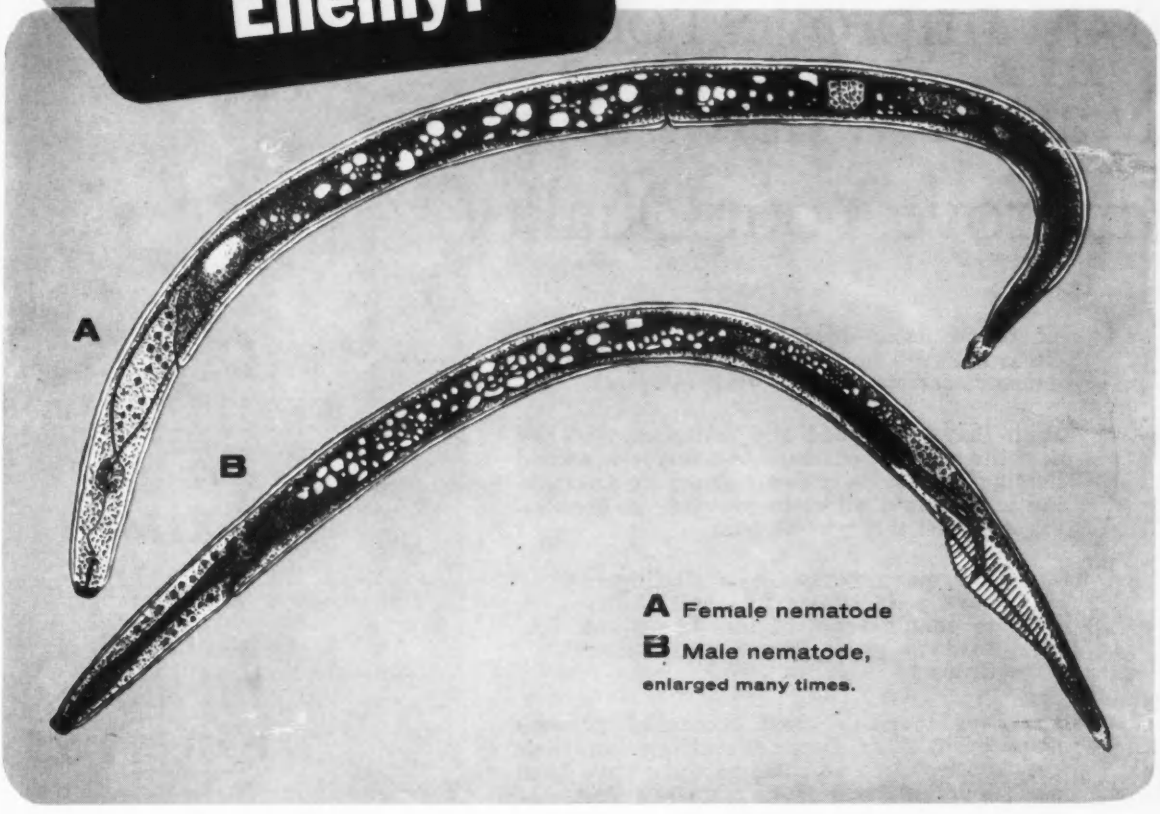
1 Year $1.00 — 2 Years $1.75 — 3 Years $2.50

SUPERIOR
FERTILIZER AND CHEMICAL COMPANY

FERTILIZERS AND INSECTICIDES THAT ARE SUPERIOR

Factories and Offices: TAMPA and FORT PIERCE, FLORIDA

Major Citrus Enemy!



A Female nematode
B Male nematode,
enlarged many times.

D-D® kills nematodes

SOIL FUMIGANT

Nematodes are one of the chief causes of serious citrus downgrading. Nematode damage results in citrus losses amounting to millions each season.

Stop these pests from damaging your citrus trees. *Before planting*, knock out nematodes with powerful D-D soil fumigant.

D-D soil fumigant is an easy-to-use liquid. Injected into the soil with inexpensive tractor attachment or gravity-flow plow equipment, it becomes a potent gas, killing nematodes as it spreads. And it's economical, too. One pre-plant treatment is all you need for effective control.

What's more, D-D soil fumigant kills other citrus-stunting nematodes such as burrowing root knot, meadow, and citrus nematodes. Important, too, this powerful soil fumigant prevents resuckering of old nematode-infested roots.

Don't gamble with nematodes in your new grove. Use D-D soil fumigant before you plant. It's available from your pesticide dealer. See him today.

SHELL CHEMICAL CORPORATION
AGRICULTURAL CHEMICAL SALES DIVISION
55 MARIETTA ST. N. W., ATLANTA 3, GEORGIA

SHELL

You Improve Your Market When You Improve Your Quality

There can be no doubt but that consumers of citrus fruit are becoming more critical in their demands for high quality fruit . . .

Fruit that looks good and fruit that stirs the appetite of the consumer to ask for a second helping, so Florida growers generally are making a concerted effort to provide the consumers with just this type of fruit.

> For many years Lyons Fertilizers have been known for their ability to enable users of this fine plant food to grow Bigger and Better Crops.

Many of Florida's most successful growers have been using Lyons Fertilizers on their groves for years . . . some of them have been using our products from the very first day we started manufacturing these fine Fertilizers.

> It has been our constant ambition to produce the finest fertilizer that fine ingredients and the best manufacturing processes can produce.

We will be glad to welcome you to the Lyons Fertilizer Company family. Incidentally our staff of field service men are highly competent and will be glad to offer you their counsel and assistance at any time.

LYONS FERTILIZERS Produce MAXIMUM CROPS Of FINEST QUALITY

Lyons Fertilizer Company

Phone 43-101

TAMPA, FLORIDA